THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXXII. No. 800.] LONDON, SEPTEMBER 10, 1878. [30TH YEAR.] Price 6d.

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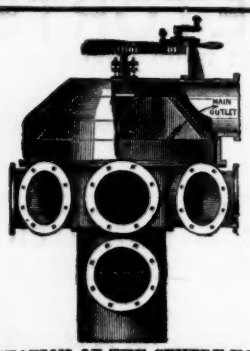
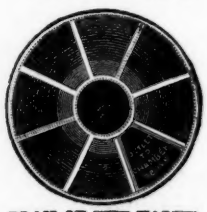
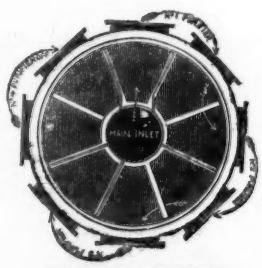
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

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THE ORIGINAL PATENTEES AND MANUFACTURERS OF THE

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FOR PURIFIERS, GASHOLDERS, BYE-PASS, AND OTHER ARRANGEMENTS REQUIRING VALVES IN GAS-WORKS.

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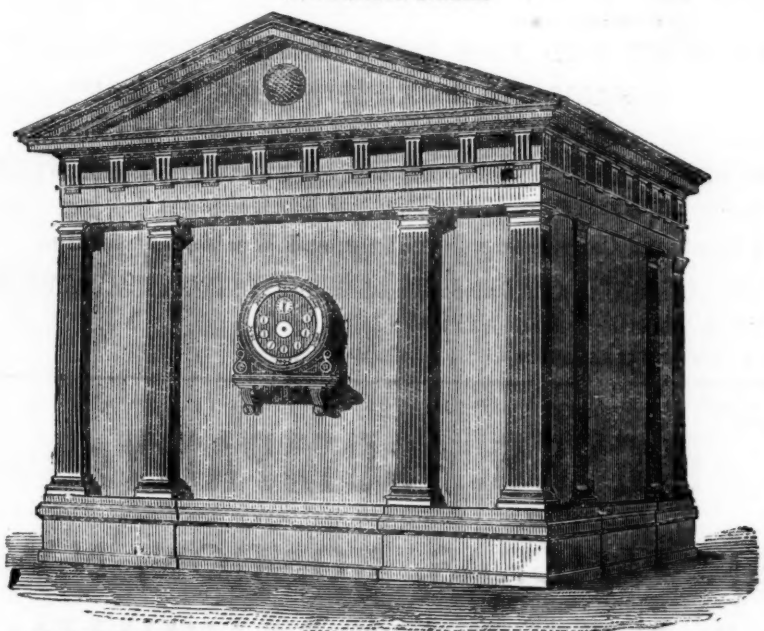

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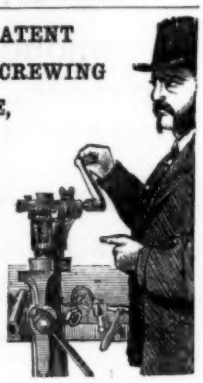

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In use at the chief gas-works, and giving great a tisfaction.

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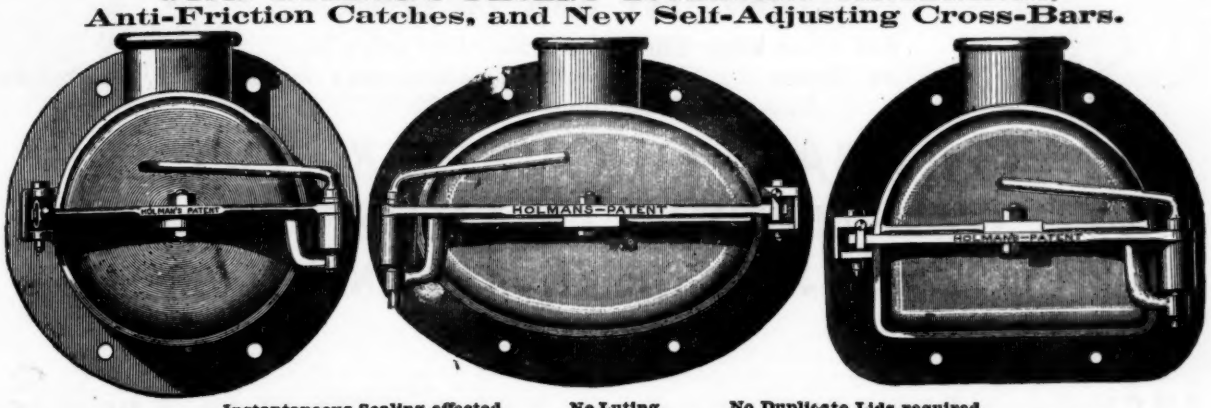
WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

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And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

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The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,

(Signed) JOHN JOHNSON.

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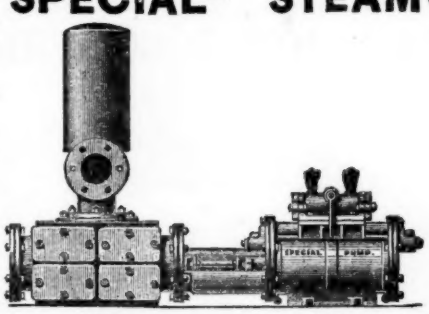
THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



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Dublin, 1865.

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The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

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DRY GAS-METER MANUFACTURERS,

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LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

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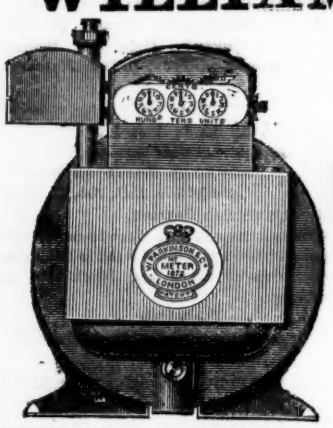

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PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

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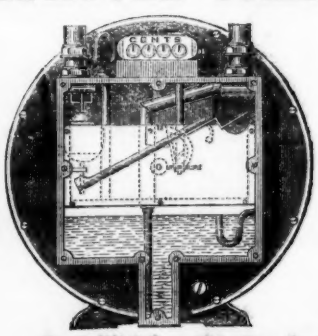
In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

L. W., Liverpool.—*Your letter is not suited for publication in our columns.*

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 10, 1878.

Circular to Gas Companies.

THE electric light continues to be the general topic of conversation in gas circles. At the meeting of every Company timid Shareholders put perplexing questions to the Chairman, only to receive one answer—viz., that, at the present moment, gas has nothing to fear from rivalry of the new light. Those who have been to Paris, come back, we may say, dazed, and, having seen the Avenue de l'Opéra and the Magasin du Louvre, they fancy that the doom of Gas Companies is sealed. How far this is from being the case time alone will show. To-day it is sufficient to say that electric lighting makes no progress in the Metropolis. The limited display at the Gaiety Theatre still continues; but Mr. Hollingshead, with all his influence and knowledge of City matters, seems to make no effort to extend the use of the light. It may not be correct to say that it does not take in London; but certain it is that the promoters of the Jablochkoff system failed to impress the public with the value of that light, and now M. Loutin's invention attracts but small attention. It may be said that electric lighting is still in its infancy here; but we notice no advance towards adolescence. Capitalists are probably shy, and hesitate to invest money in a very imperfect invention. How the capital is raised in Paris is somewhat of a mystery to us; but the French are very speculative people. Here, where money is much more abundant than in France, and there is no lack of speculation if fair promise of reasonable profit is seen, the electric light, as we have said, makes no way. The only inference we can draw is that the public do not believe in it.

Metropolitan gas shares and stock are steady at the reduced prices. All evidence of panic is absent, although it is clear that the minds of Shareholders are not quite easy as to the future value of their investments. We had a suspicion that interested parties in the City were doing their utmost to depreciate gas property, and we find a proof that such is the case in the circular of a well-known Sharebroker, who writes as follows:—"It ought "to have been clear to the most ordinary mind that the day was "not far distant when some other illuminating power would "come into competition with gas." Our friend, it will be seen, is gifted with marvellous foresight. "But it cannot be ignored "that there is, at last, a slow awakening to the fact that we are "on the eve of a great revolution in the lighting of our cities "and towns." We have been on the eve of so many revolutions, which have never come off, that we may wait with complacency for the one which is to demolish the aristocracy of gas. "Gas "Companies," the circular goes on to say, "have never made "friends with the public." What reason have we to believe that the purveyors of the electric light will do more to conciliate the public? If we displace one monopoly by another, what is gained? But the pith of the circular will be found in the following quotation, which, it must be remembered, emanates from a broker:—"It is only right to warn holders of gas "shares that they should not be indifferent to what is passing "around them; and, as I know many instances where investors "have nearly all their property in this particular kind of "security, they should anticipate events, and divide it, over a "wider area, in various investments at home." Doubtless, the writer of these words has speculations which he would recommend; but, for all his blandishments and professed sympathy for the fortunate holders of gas shares, whose fate he seems to commiserate, we recommend these latter to keep firm hold of their property, and reap the advantage which is certain to be obtained for very many years to come.

The Gaslight and Coke Company continue their experiments with the electric light, under the superintendence of Mr. Sugg. We understand that some important facts as to illuminating power and cost have been elicited in the course of the investigation; but as the trial is not yet complete, these will not, at present, be made known. It is quite clear that the Chartered Company have no fear of the competition of the light, although, as they illuminate the greater number of the large spaces in the Metropolis, it might be expected that they would suffer most, if it came into use. Public lighting is, after all, a very small part of a Gas Company's business. The profits are made where the electric light cannot penetrate. We believe in the progress of science, and feel the danger of indulging in prophecy; but, for all that, we entertain a firm belief that gas will last our time. It is hardly worth while to speculate further; time will reveal how much we have to fear from the new competitor for public favour. We only notice what is passing around us to-day, and can but once more repeat our advice to gas shareholders, to stick to their investments. A trial of the light, it is said, will be made at the shell foundry of the Woolwich Arsenal; but this would appear mainly for the purpose of using up some old materials. It was proposed to use the light on board our ironclads, for signalling and other purposes. We do not know how many ships have been fitted with the apparatus; but we read that a large quantity of materials have accumulated at Woolwich, some of which it is now proposed to utilize in the way we have mentioned.

The report of the Directors and the accounts of the Crystal Palace District Gas Company for the past half year have been published, in anticipation of the meeting to be held on the 19th inst. The accounts show a balance of profit amounting to (after the appropriation of £2000 to the reserve-fund) £11,103, which, after the payment of full dividends, leaves £914 to be carried forward to the next account. The Directors announce their intention to reduce the price of gas to 3s. 9d. per thousand feet, to commence at the Michaelmas quarter. This reduction will be appreciated, and we have no doubt the consumption of gas in the district will, in consequence, be largely increased. The several reserve-funds are tolerably full, and there is no doubt that dividends will be maintained. We note with satisfaction that favourable coal contracts have been entered into for the next two years. It would seem that this is the longest period for which contracts can now be made, and we must caution our readers against expecting lower quotations. Coals are certain to rise in price; and while it is undoubtedly the duty of Gas Companies to give consumers the benefit of present quotations, reductions in the price of gas should be made with caution. While the time is favourable, as much as possible should be added to the reserve-fund.

The Wrexham Gas Company have just held their yearly meeting, and declared full dividends, paying, at the same time, back dividends for the year 1873—two and a half per cent. on

consolidated stock entitled to ten per cent., and one and three-quarters per cent. on shares entitled to seven per cent. As the Company have made a reduction in the price of gas, no objection could be made to the payment of these dividends. The reduction in the price has not been followed by the increase of consumption anticipated; but as better times come round, the Wrexham Company, like every other, will feel the benefit which always arises from cheapening the price of gas.

The annual meeting of the Sunderland Gas Company was held last Wednesday, when the Directors presented a gratifying report. It is true that the increase of consumption does not progress at the rate it ought in Sunderland, considering the large additions to the population of that place. Still, there is an increase. Maximum dividends are paid, together with a bonus on account of dividends in arrear. We are glad to see that this is again accompanied by a reduction of twopence per thousand cubic feet in the price. The Chairman, as will be seen in the report to be found in another column, made some lengthy remarks on the electric light, in which he fully endorsed the views we have always put forward. If this light frightens Corporations from purchasing gas undertakings, it will have rendered Gas Companies an essential service. The Corporation of Sunderland seem to have lost all desire to purchase the gas undertaking, but whether from fear of the new light or dread of arbitration it is not clear.

The Derby Gas Company also pay full dividends, and have the large balance of £2488 to be carried forward to next half year's account. The Chairman appears to think that the price might be reduced, but no resolution on the matter seems as yet to have been come to.

It is scarcely necessary to say that the Scarborough Gas Company have had a prosperous year. Maximum dividends, which, however, absorb nearly the whole of the profits, were declared at the meeting held last week. Scarborough, however, increases so rapidly, and the consumption of gas keeps pace with the growth of the town and neighbourhood, that the Company may look forward with confidence to long-continued prosperity.

Watering-places are, no doubt, favourite localities for the operations of Gas Companies, and Hastings forms no exception to the rule. At the half-yearly meeting of the Gas Company, just held, full dividends were declared, and a sum of £1 per share on the original shares was paid in respect of arrears of statutory dividends. Here again we notice with pleasure that at the same time a reduction of twopence per thousand feet in price was announced. We hope this will satisfy some of the grumblers in Hastings, who have been for some time agitating to have the charge lowered.

The West Bromwich Improvement Commissioners are complaining of the price charged them by the Birmingham Corporation, which, they say, is sixpence per thousand feet more than was charged by the Birmingham and Staffordshire Gas Company at the time of the coal famine. The Chairman of the Commissioners added that the present increased price is equal to a rate of £3000, which is levied on West Bromwich for the benefit of Birmingham. It would appear that the awards, under the arbitrations to settle the price to be paid for the portions of the Corporation's works to be divided amongst the four outlying districts, have been made, but, owing to circumstances, have not been taken up. The several districts will acquire their portions of the undertaking in 1880.

For the past twenty-five years the city of Rio de Janeiro has been lighted by a Company formed in London, who have, we believe, given general satisfaction. Their concession expires next March, and in view of this, negotiations have for a long time been pending between the Company and the Brazilian Government for a renewal of the concession. Unfortunately they have not been successful, and now the Government are carrying on matters with rather a high hand. They have advertised for tenders from parties willing to supply the city with gas, and, if this were all, no complaints could be made. It is clear, however, that no one who obtained a concession next January would be in a position to furnish gas by the end of March. But the Government fall back upon one clause in the concession about to expire, which, according to their interpretation, gives them the power to make a compulsory purchase of the plant of the Company, on the expiration of the contract, at a price to be fixed by valuers appointed by themselves. This is, of course, downright confiscation, and we are astonished that any minister should lend himself to such a proceeding. We must mention that, should the Government obtain possession of the works, they intend to hand them over to the new Concessionaires for the price paid. We should think it extremely doubtful whether, with the prospect of similar treatment before them, any body of capitalists would be disposed to tender; certainly no English capitalists would be likely to do so. It will be seen that, although the Government propose to furnish the new Concessionaires with works ready made at a cheap rate, the conditions they impose are so onerous that any Company would find it difficult to comply with them. Under these circumstances, we think it not improbable that, after all, the appeal which the present Company intend to make to the Emperor in Council will lead to the establishment of a better understanding, and that the unjust designs of the Minister of Agriculture will be frustrated. The Emperor of the Brazils has, we believe, a well-deserved reputation for honour and probity, and we cannot think he will allow a body who have served the state well to be robbed of their property. If matters should go on to the worst, perhaps a little gentle remonstrance from our Foreign Office would be of some avail.

The powers of Gas Companies and Corporations to supply fittings, without some provision in their Acts specially authorizing them to do so, has always been considered doubtful. The Leeds Corporation, under the advice of their Engineer, proposed to furnish their customers with small cooking and heating stoves—not let out on hire, but lent without consideration. This would have involved expenditure of Corporation money in the purchase of the apparatus, and, uncertain whether they had the power to expend corporate funds for the purpose, they obtained legal opinion, which is, unfortunately, against them. It seems to us, however, that the clause in the Leeds Gas Act, 1854, to which the attention of Counsel was called, would perfectly justify the Corporation in taking the step they proposed. A gas-stove may be very properly included in the general term of fittings, and whether gas is utilized to give light or scatter warmth, it comes, practically, to the same thing. In either case, it is utilized after it has been supplied. Counsel's opinion, if pushed to its logical conclusion, would stand as much in the way of the Corporation supplying burners as gas-stoves. The design of the Gas Committee is a very excellent one, and, if carried out, would produce valuable results both to the Consumers and the Corporation. We presume the opinion will be acted upon; in which case, a short Act of Parliament should certainly be obtained, giving specific authority to deal in gas-stoves and cooking apparatus. It is not unlikely that some other Counsel would give a different opinion. In any case, we do not think the Corporation would have anything to fear if they carried their liberal design into execution.

Water and Sanitary Notes.

The Royal Commission on Noxious Vapours have just issued their report, which is naturally followed by a series of recommendations which it is proposed to embody in an Act of Parliament. The first thing that strikes us on looking over these is that the day is approaching when Mr. Lowe's prophecy will be fulfilled, and the Inspectors equal in number the inspected; for it is now proposed to place every branch of chemical industry under the supervision of Inspectors, appointed by the Local Government Board. We have no objections to offer to most of the proposals of the Commissioners. Acid vapours should, as far as possible, be suppressed, and this we know can be done without much trouble or cost to the manufacturers, and often with undoubted profit to them. A grain of sulphur, in the shape of sulphur acids, in a cubic foot of exit gases (measured at standard temperature and pressure) is as much as should be allowed to escape into the air; so also is half a grain of nitrogen, in the shape of its acids. An enormous amount of damage is done by them, which may just as well be kept for profitable utilization. We are half astonished that gas-works are not included in the list requiring inspection; but these are omitted, and only in cases where sulphate of ammonia is manufactured do the Commissioners propose to subject them to supervision, with a view to compel the adoption of the best means for preventing the escape of sulphuretted hydrogen. In like manner it is proposed to subject manure works, and, in general, all manufactures in which disagreeable emanations are evolved, to supervision, with a similar view. We need hardly say anything about the metal industries, which, it must be admitted, require control. Dry copper and arsenic works are undoubtedly obnoxious, and, without much trouble a great deal may be done to prevent the escape of the vapours which are so inimical to vegetation. Some study, however, must be given to this matter before hard and fast lines can be drawn. Coke ovens and cement works, which it is also proposed to subject to inspection, will constitute greater difficulties. In each case cheapness of production is of the utmost importance, and fanciful additions to existing arrangements are out of the question. We notice that the Commissioners suggest that the proprietors of existing coke ovens

should be allowed three years to make alterations for preventing the escape of black smoke and diluting sulphur compounds. The question arises, Who is to teach manufacturers to do all which the projected new Act will require of them? We see appointments open to a large number of young chemists, whose analytical skill and powers of vision will be exercised at the expense of manufacturers. It may be said that it is not the business of a Government Inspector to teach manufacturers how to conduct their works without producing a nuisance; but, in the present state of science and practice, it must be admitted that we have not a sufficient knowledge to enable us entirely to suppress the noxious vapours, as they are called, which, in the Commissioners report we are now noticing, they propose to suppress. The Act which is projected will take several years to pass, and, in the meantime, the Commissioners report will be in the hands of all interested. They will well consider the nature of the additions and alterations to their works which will be necessary to carry out the requirements of any new Act of Parliament. It will be advisable to keep a vigilant eye on the proceedings which may be taken by the Local Government Board in carrying out these recommendations. We notice that aniline dye-works are to be subjected to supervision. We do not know what nuisance these create, but the manufacture of the dyes is, to a great extent, a secret business, and the intrusion of a chemical inspector will always be regarded with jealousy by a manufacturer. For the rest, little need be said about the projected new enactment, which, like the Rivers Pollution Act, will occupy years in discussion, and eventually pass in a form very different to that in which it is introduced.

The retirement of Major Graham seems likely to bring about some alterations in the constitution of the Registrar-General's Office. The department will fall, naturally, to the Local Government Board; but, as the Board are already much overworked, and things go on in anything but a satisfactory manner, it is proposed to split up its functions, and place some of them under the direction of a Minister for Public Health. We should have no objection to this, if the appointment were made non-political and permanent; but we have the strongest objection to see a thick-and-thin supporter of a Government, whether Whig or Tory, pitchforked into a well-paid place, for the performance of the duties of which he has no single qualification. The matter, we hope, will receive the serious attention of the Government, who should consider it entirely apart from politics. A competent Minister of Public Health might be of the utmost benefit to the community, but we confess we do not know where to look for him.

The Liverpool Corporation, we understand, have decided to defer for another year their application to Parliament for powers to carry out their scheme for taking the head waters of the Severn. This is, perhaps, wise; but if it be true that the present water supply of Liverpool is only sufficient for a normal increased demand at the end of four years, it is certain steps must be taken at an early date for providing additional quantities. The further sinking of the Bootle Well is not expected to yield the quantity which will be wanted for Liverpool at the end of the next four years, and it is not at the present time proposed to make experiments at other wells, which could only result in failure. Liverpool must, therefore, go farther afield. The incessant squabbling in the Town Council about water is not creditable to that body. The question should be looked at in a broad light. There are always, however, in councils, town or other, men like Alderman Bennett, with a fixed idea, who, if they have a sufficient following, it is not easy to put down. We mentioned last week that it was decided that the further boring of the Bootle Well was to be carried out by the Diamond Rock Boring Company; but the resolution has been rescinded, and it is now decided that the next 500 feet shall be bored by Messrs. Mather and Platt, of Salford.

The Manchester Town Council have done their utmost to place before the ratepayers a true state of the water affairs of the city previous to the poll on the Thirlmere scheme being taken. It is certainly remarkable that the scheme is opposed by only two members of the Council, whose motives cannot be conjectured. They are no doubt actuated by public spirit, but, as it appears to be generally admitted, their statements are not to be relied on. They mix up personal matters in the discussions; and we think the ratepayers will estimate their statements at their proper value, and side with the majority of the Council. Before our next issue we shall have learnt the result of the poll, and shall be greatly astonished if the resolution carried at the town's meeting is not confirmed.

The Derby Water-Works Company, after making a small draw on their contingent-fund, pay 7 per cent. on all classes of shares. The income of the Company, though progressive, has not owing to the depression of trade, increased at such a rate as might have been expected. A revival of trade, which we hope is not far distant, will put the Company at their ease again. Shareholders who are, of course, anxious for larger dividends, wish to have the charge for water increased. The Directors, however, notwithstanding that the Company supply water at a very low rate, said to be only one-third that at which Manchester is served, wisely decline to raise their charge. They will by-and-by find their profit in this, for such liberality will keep them free from all attacks and attempts at confiscation.

Complaints are made at Chatham and Rochester that the Water Company have recently shut off the night supply, and various evils are expected to result. The Medical Officer reports that foul air gets into the mains when the water is absent, and hence germs of infectious diseases are distributed among the population. As there are no infectious diseases prevalent in Rochester and Chatham, the reasoning is not very cogent. The rational excuse made by the Company for cutting off the night supply is the enormous waste which results when water is being left in the mains under pressure, and none is drawn. If the Company had the power to compel consumers to have proper fittings, and keep them in order, they might, after creating a great uproar, and causing much discontent, continue a constant night service; but, under present circumstances, so far as we can understand the matter, this would be impolitic on their part. Adequate protection from fire might be secured by adopting the suggestion made by the Company's officers, that the means of telegraphic communication should be laid down from the town to the works; this being done, the water could be immediately turned on at full pressure. We fail to see what the Corporation of Rochester have to complain of, unless they can establish their case that a distinct promise was made by the Chairman of the Company, that a constant supply should always be maintained.

Presentation of a Testimonial at the York Gas-Works.—On Monday evening, the 2nd inst., the *employés* of the York Gas Company made a presentation to the Foreman of the Gas-fitting Department—Mr. Thomas Dalton—who, through advanced age, has been compelled to retire from that position after 20 years service. The testimonial consisted of a handsome timepiece and a pair of spectacles, the former bearing as an inscription—"Presented to Thomas Dalton, Sept. 2, 1878, by his fellow-workmen, as a token of their esteem during his 23 years foremanship over the fitters of the York Gas Company." The presentation was made by Mr. Sellers, the Company's Secretary, who cordially sympathized with the object of the subscribers, and said the little token of kindliness would not only be a source of great pleasure to Mr. Dalton during the evening of his days, but it was a compliment to the manliness of workmen, who could throw off the irritations and annoyances inseparable from business, and, after their long relationship with their late foreman, remember only his good deeds. Mr. Dalton will still remain with the Gas Company.

Waverley Association of Gas Managers.—The thirty-fifth half-yearly meeting of this Association took place at Haddington on Wednesday last. The Secretary read the report, showing a considerable cash balance on the right side. This was unanimously approved of. The members then entered into an animated discussion as to the merits and demerits of wet and dry gas-meters, which ended in a preponderance of opinion in favour of the wet meter. The electric light also came in for a share of discussion, Mr. Robb giving his impression of it, as seen at the various places where it is at present exhibited in Paris. He stated that, in his opinion, a bright future was in store for the electric light; in fact, he looked to electricity as the source from which future ages will derive all the light, heat, and power necessary for the well-being of the human race. Afterwards the company sat down in the George Hotel to a sumptuous dinner, and concluded a pleasant and profitable day's intercourse. The next meeting is to be held at Portobello, on April 2, 1879.

Explosion of Gas at Newcastle-on-Tyne.—An explosion of gas occurred on Saturday, the 31st ult., in the Assembly Rooms, Newcastle-on-Tyne, in which an exhibition of pictures is about to be held. Some one had turned on the gas, and the taps being open in the lobby, the room was filled with gas. On a policeman entering with a light the gas exploded, blowing out the windows and doors, and hurling him with the door against the bannister, which gave way, and he fell to the landing below, being very much burnt. There was a very valuable collection of pictures in the adjoining room, but only a few water colours had their frames and glasses broken, being otherwise uninjured. The damage is estimated at £500.

Birkenhead Gas and Water Supply.—At the meeting of the Birkenhead Town Council last Wednesday, a recommendation of the Gas and Water Committee was agreed to that "the present price of gas to consumers by meter be reduced 3d. per 1000 cubic feet from the 1st of October next; that the rate of charge for public lamps to the Watch Committee in the borough be also reduced; and that a reduction corresponding with the reduction of 3d. per 1000 cubic feet of gas be made on the rates charged for water for domestic use from the 31st of December next." In the course of the discussion, it was stated that there was a balance of between £30,000 and £40,000 available for a depreciation and extension fund.

Skelmersdale Gas-Works.—On Monday, the 2nd inst., gas was used for the first time in the township of Skelmersdale. The occasion was one of general rejoicing, and several extensive illuminations were displayed. The new gas-works form a compact block of buildings at the rear of the public offices, and have been erected at an estimated cost of £8000 from designs by Messrs. Goodison, Atkinson, and Forde, of Liverpool, Engineers to the Local Board. Mr. Edward Booth has been appointed Gas Manager, and he has been acting as Clerk of the Works during their construction. Great credit is due to all concerned for the manner in which the various works have been carried out, and the experimental lighting on Monday night foretells a good quality of gas for the inhabitants of Skelmersdale. It is intended to charge 5*s.* per 1000 feet, and the Local Board mean to deal very liberally with all applications for gas made within six months, by putting down connections, &c., free of charge. Although only a portion of the township is lighted, it is expected that in about three weeks or a month the connections will be complete.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

THE POWERS OF GAS COMPANIES IN REGARD TO THE SUPPLY OF FITTINGS AND STOVES.

Sir,—At a time when gas proprietors are being severely exercised by the possibility of competition through the electric light, it will probably be interesting to some to know what may be done in the direction of cheapening and still further popularizing the much-abused but honest article which, notwithstanding the "whips and scorns" of a host of detractors, still holds its own against all competitors.

For my own part, I am quite disposed to welcome the new comer, and, in fact, to "trot him out;" for, though I believe he can have no chance, except in a very limited field, yet it is most likely that his appearance may have the effect of bringing out the latent capabilities of competitors who have grown careless in the chase.

But, at the outset, I have to confess to a sad reverse, which has happened as follows:—I had presented to my Committee a report on the advantages derivable from an increased use of gas during the day,* in which I recommended the lending of a small stove to every consumer. My Committee were so far convinced by the arguments adduced that they resolved to give the scheme a trial on a tolerably liberal scale.

Shortly afterwards, it occurred to our much-respected Town Clerk that the Corporation did not possess the necessary powers under their Act. It was ultimately agreed, however, that Counsel's opinion should be taken on the point. I was confident of success. So was the Town Clerk. The oracle has spoken, and I am crestfallen, and not a little amazed at the divination. I feel sure that the case will be of interest to your readers, and therefore I will here quote so much of it as is necessary, and Counsel's opinion thereon.

Case.

Counsel will receive herewith the Leeds New Gas Company's Act, 1854, and the Leeds Corporation Gas Act, 1870. His attention is called to section 7 of the Leeds Gas Company's Act, which is as follows:—

"That the Company shall be established for the purpose of *supplying and lighting* with gas," &c.; "and also for the dealing in coke, tar," &c.; "and also for manufacturing, selling, or dealing in *gas-fittings*, tubes, meters, pipes, and all other articles and things in any way *connected with gas-works*, or with the *supply* of gas to the consumers thereof in such manner as the Company may think proper."

Counsel will also be good enough to peruse the 20th section of the Leeds Corporation Gas Act, which is as follows:—

"From and after the execution of the transfer by either of the Companies, all the statutory and other rights, powers, and privileges by any Act conferred on the Company transferring, so far as the same can be applicable to a Municipal Corporation"—"shall apply to and be vested in the Corporation, and may be used and exercised by the Council."

The question upon which Counsel's opinion is requested arises under the following circumstances. The Gas Committee of Leeds, with a view to increasing the sale of gas, are wishful to purchase a large number of small gas-stoves for cooking and heating purposes. These stoves the Committee propose to lend out to the inhabitants, but they do not intend to make any charge for the loan of them. The demand for gas being thus stimulated, the Committee expect that considerable profit will be rendered from their proposed scheme.

Counsel is requested to advise whether, in his opinion (the purchase of the stoves being in the nature of a speculation), it would be competent for the Corporation, under the statute, to spend the corporate funds upon the purchase of stoves, for the purpose of lending such stoves *without payment*. If counsel should be of opinion that it is not competent for the Gas Committee to allow the stoves to be distributed without payment by the parties using them, he will kindly advise whether, in his judgment, it would be safe to let them out on payment of an annual rent, as in the case of meters.

Opinion.

Counsel replies as follows:—

"I am of opinion that it is not competent for the Corporation, under the powers of the Acts of 1854 and 1870, or otherwise, to spend the corporate funds upon the purchase of stoves for heating and cooking, either to be lent to the householders without payment, or to be hired out to them for a consideration. Such stoves do not, in my opinion, come within the expression 'gas-fittings;' and I am also of opinion that the general words, 'and all other articles and things in any way connected with gas-works, or with the supply of gas to the consumers,' are likewise insufficient to include the stoves, as they cannot be said to be articles connected with gas-works, nor are they connected with the *supply* of gas, but rather with the utilization of the gas after it has been supplied. If, when the Corporation are next before Parliament for further powers, they should seek this new power, I think it not unlikely that Parliament would grant it."

Now, Mr. Editor, I have great respect for the authority who has spoken; but will you kindly open your columns for a discussion of the case? If the opinion given be correct, then there are already many transgressors of the law amongst companies and corporations; and it behoves all parties applying to Parliament to see to it that the spirit and intention of their Acts is not frustrated by the omission of a word.

Leeds, Sept. 6, 1878. HENRY WOODALL.

THE ESTIMATION OF SULPHUR IN COAL GAS.

Sir,—In the method of testing for ammonia and sulphur in the gas supplied to London as prescribed by the Metropolitan Gas Referees, I believe there is a great fault.

On page 6 we read: "The remaining half of the liquid is to be put into a flask, or beaker, covered with a large watch-glass, treated with hydrochloric acid sufficient in quantity to leave an excess of acid in the solution, and then raised to the boiling, but not so violently as to occasion loss by spirting. An excess of a solution of barium chloride is now to be added," &c.

I am somewhat astonished that the Gas Referees should have issued such instructions; for what is the fact? There are always found in the products of the combustion of gas sulphuric acid and sulphurous acid. The experiments of Mr. Young have taught us that the formation of sulphurous acid is of no consequence, but I am not of the same opinion. I have made several experiments analogous to those of the Gas Referees, and I have always found that there is formed a great deal of sulphurous acid.

In one of these experiments I proceeded as follows:—The gas was burnt at the rate of half a cubic foot per hour, and the total consumption was 10 feet. At the end of the testing, the cylinder and trumpet-tube were well washed out with distilled water, and the water used in washing was well mixed with the liquid in the beaker. All the liquid was then divided in two equal parts. The one was treated just the same as prescribed by the Referees, the result being 0·1775 gram of SO_4 Ba, or 0·1772 gram of sulphur in 1 cubic mètre of gas (7·72 grains in 100 cubic feet). The other half of the liquid was oxidized by nitric acid, to transform the sulphurous acid in sulphuric acid, the result being 0·4085 gram of SO_4 Ba, or 0·4079 gram of sulphur in 1 cubic mètre of gas (17·80 grains in 100 cubic feet).

As we see, there is a great difference, and therefore I believe (as the result of many experiments) that there a great mistake would be made if the instructions of the Referees were closely followed. Hydrochloric acid is a strong, and sulphurous acid a weak acid; therefore, by boiling with the first acid, the sulphurous acid is expelled, and there will always be found a sulphur quantity, which is below the actual amount.

I think this is a matter of great importance for Gas Companies and Gas Examiners. If there is formed but little sulphurous acid, the result will always be beneath the truth, when the liquid is not oxidized with nitric acid or something else.

Haarlem, Aug. 31, 1878. A. J. VAN EYNDHOREN, Chemist.

[The Metropolitan Gas Examiners are bound to follow the Instructions of the Gas Referees, but for our own part we always oxidize by nitric acid, only adding sufficient to produce a decided acid reaction in the boiling solution. Our correspondent probably exaggerates the amount of sulphurous acid in the condensed liquid.—Ed. J. G. L.]

* This report will appear in the next number of the Journal.—Ed. J. G. L.

Legal Intelligence.

SOUTHWARK POLICE COURT.—Thursday, Sept. 5.

(Before Mr. Benson.)

COMMITTAL FOR NON-PAYMENT OF GAS-RATES.

Edward Howard, of Thomas Street, Kennington Park, was summoned by Mr. Allen, an Officer of the Phœnix Gas Company, to show cause why he did not obey an order from this Court to pay the sum of £3 17s. 9d. and costs, for gas supplied to him while carrying on business in Myatt's Road, Brixton.

Mr. *Allen* said that the defendant left the latter place more than six months ago, being indebted to the Company in the amount sought for. As soon as witness was able to find out where he resided, he obtained a summons against him for the recovery of the amount, but he did not attend to it. An order was served at the house, and as no notice was taken of it a distress warrant was issued, and when the Officer of the Court went to execute it he was met with a bill of sale. In consequence of that, witness was directed by the Manager to take the present proceedings to compel defendant to pay the money or submit to his Worship's decision.

The *defendant* asked for further time to pay the money.

Mr. Benson told him the money had been due more than ten months, and a man so well dressed as he (defendant) was could surely raise so small a sum.

The *defendant* said he was not prepared to pay it.

Mr. Benson: Then, in default of your paying £3 17s. 9d., and 5s. costs, you are committed to Holloway Prison for a month.

The defendant was removed by the gaoler.

Miscellaneous News.

HASTINGS AND ST. LEONARDS GAS COMPANY.

The Half-Yearly Meeting of Shareholders was held last Thursday. Mr. G. Scrivens presided, and the following report of the Directors was submitted:—

The new lift to the large gasholder, alluded to in the last two reports, is now completed, and at work for the supply of gas to the borough.

No other work of importance is likely to be wanted for the present year, but it is anticipated that some considerable addition to our purifying capacity will be necessary in 1879.

Your Directors have watched with considerable interest the advances made by the electric light on the Continent; and, while they see no immediate danger of its competing with the supply of coal gas in these towns, they assure the Shareholders that they shall still continue closely to watch its progress, and all its associations in connection with the interest of gas companies.

The accounts, duly audited, leave a balance of £4281 14s. 6d., making, with the previous undivided balance, the sum of £5357 4s. 3d. to be dealt with by the Shareholders; and it is proposed to pay a dividend at the rate of 10 per cent. per annum on the £25 paid-up shares; also £1 per share on account of the arrears of statutory dividends due on these shares; and a dividend at the rate of 7 per cent. per annum on the whole of the £20 shares. This will leave a balance of £139 14s. 3d. to be carried forward to the next account.

The Directors also propose to reduce the price of gas to the private consumers within the borough, from the 1st day of January next, to 4s. 3d. per 1000 cubic feet; and to the consumers in the outbounds, to 4s. 7d. per 1000 cubic feet.

The following three Directors retire by rotation—viz., Mr. George Scrivens, Mr. E. W. Stubbs, and Mr. James Rock. One Auditor, Mr. F. Bennetts, also retires by rotation on this occasion. All four gentlemen are eligible, and offer themselves for re-election.

The Chairman said he had to congratulate the Shareholders generally on the satisfactory completion of the new lift to the large gasholder, which doubled its capacity. It was a very costly and difficult undertaking, and the Directors were thankful that the operations connected with it had all been carried out without accident, and within about a month of the specified time. The task of planning and superintending the erection was left to their Engineer and Manager, Mr. A. H. Wood, and the Directors believed they would have no reason to regret that they entrusted the matter to him. The holder worked most evenly and satisfactorily. The whole of the works were in first-rate order; but such was the increased consumption of gas that the present plant was scarcely equal to the requirements in all respects, and they anticipated that next year some increase must be made in the purifying department. Due preparation would be made to meet that necessity. The accounts showed that, after declaring dividends of 10 and 7 per cent., a balance of £1300 would remain, out of which it was proposed to appropriate £1 per share towards the payment of statutory

dividends in arrear. The Directors had made an estimate for 1879, and although they were aware that their income would be diminished in some items, a saving would be effected in others, and they, therefore, recommended that the price of gas be reduced 2d. per 1000 feet from the 1st of January next. In reference to the electric light, the Shareholders had the same sources of information as the Directors—the accounts which appeared in the public press—and, therefore, they were quite able to form their own conclusions. What scientific experiments might ultimately accomplish no one could foresee; but as yet much remained to be done before the electric light would, he thought, supersede the general use of coal gas. He moved that the report be received and adopted.

Mr. J. H. Cook seconded the motion, and it was carried unanimously.

Mr. Elkin proposed, and Mr. Holding seconded, the re-election of the Directors, which was also carried unanimously.

The Chairman returned thanks, and said that while he held the office of Director he would endeavour to promote, as far as was in his power, the interests of the Company, with a due regard to the fair claims of the consumers.

Mr. Rock also returned thanks, and expressed a similar intention on his part. He said he had had special opportunities of watching the progress of the electric light, and he could assure the meeting he did his best to keep his eyes open and learn anything that might be commercially for the benefit of the Company.

Mr. Walder asked whether, in the event of the electric light being successful, the Company would be able to take it in hand and supply it as they did gas. He thought that no one could do it better than the Company.

The Secretary (Mr. Young) said the Directors had given their attention to that point so far as they were able to do so.

The Chairman said that he had seen the electric light worked, and must admit it was a most extraordinary light. He saw it at Paris on the night of the illumination.

Mr. Walder moved, and Mr. J. Turner seconded, the re-election of Mr. Bennetts as Auditor, which was unanimously adopted.

Mr. Rock, again referring to the electric light, said many persons had gone to Paris and had been impressed by the way in which it had been displayed there. But they must bear in mind that, to use a French expression, Paris was *en fête* just now. The Commissioners, and even the Government, spared no expense to give *éclat* to the Exhibition, and to make it successful. Therefore, they must not look at that as the true index of the competition of the electric light with coal gas. At the same time there could be no doubt that there had been considerable progress in the scientific part of the business, and it was just possible that in the course of time the electric light might be brought down in expense so as to compete with gas. At the present time it was much too expensive, and, as long as the Company could supply a good light at a moderate cost, there was not much reason to fear the electric light. It was not yet applied to domestic purposes, which, as they were aware, was much the larger part of their consumption. If they illuminated the town with the electric light, there would remain a great demand for gas for private consumption, and that was not likely to be supplanted for some time to come.

Mr. Elkin said he had been to Germany within the last month, and, judging from the illumination he saw at one of the watering-places, he thought the electric light was a failure. Probably greater expense was incurred in Paris.

Mr. Holding asked if there was any possibility of its superseding gas for private consumption.

The Chairman alluded to the introduction of the electric telegraph, and the way in which it advanced step by step to its present state. The quarter to which he looked for a further development of the electric light was America, for there seemed to be little bound to ingenuity on the other side of the Atlantic. But when he saw in the Place de la Concorde, in Paris, the brilliant illumination of the electric light, it appeared to him somewhat similar to vivid lightning, and he thought the fault of the light would be that it would be too strong, the eye not being able to bear it without the use of opal shades. If the light was fixed at such a place as the Memorial, it would illuminate the whole of the surrounding thoroughfares; but what it would do for domestic purposes he would not say.

Mr. J. H. Cook proposed a vote of thanks to the Directors, who, he said, always studied the interests of the Shareholders, and the public too.

Dr. Kernot seconded the motion, and it was carried unanimously.

The Chairman acknowledged the compliment, and said it was always pleasant to find that a favourable view was taken of their efforts. Of course, they could not expect that all they did or said would be free from criticism; but they were glad if, in the main, they could do what was believed to be for the interests of the Shareholders, and at the same time supply private consumers in such a way that there could be no unfavourable comparison with other places. If the Directors had done that, he was sure they were rewarded by the vote of thanks that had been passed.

SUNDERLAND GAS COMPANY.

The Annual Meeting of this Company was held last Wednesday—Mr. E. C. Robson in the chair—when the following report of the Directors was presented:—

Your Directors have pleasure in announcing their intention to reduce the price of gas 2d. per 1000 cubic feet from the commencement of next quarter.

An interim dividend was paid in March last, and your Directors now recommend the declaration of a further dividend of 5 per cent. on the original stock, and 4¼ per cent. on the additional capital stock of the Company, payable on the 14th of September. They also recommend the payment at the same time of 5*s.* per share on the original stock of the Company, on account of the deficiency in the dividends of previous years.

During the past year your Directors have sold 1000 shares, "additional capital," and they now propose to sell by auction, at the close of the annual meeting, other 500 shares, to enable them to meet payments on account of recent extensions at Hendon.

The retiring Directors are Messrs. R. Vint, A. Thistlethwaite, W. Armstrong, and J. J. Allison. The retiring Auditor is Mr. H. G. Armstrong. The whole of the above are eligible for re-election.

The Chairman moved the adoption of the report. He said that he thought the Shareholders would all agree with him that it was a matter of congratulation that, during a season of commercial depression (unexampled, he believed, since 1842), the Directors were able to present a report so favourable as the one now before the meeting. Not only did they recommend the payment of the full statutory dividend and a balance on account of the dividends left unpaid, but they were able to recommend a reduction in the price of gas to consumers. That amount seemed small when it was stated as so much per 1000 feet, but it represented in round numbers £2000, limited to consumers in the town. The increase in gas and meter rents was £1810, and there had been manufactured 9 million cubic feet of gas more than in the preceding year. That was a very small increase when they took into consideration the increase in the population of the town. While the ordinary rate of increase in the consumption of gas was 8 per cent., the increase during the past year only amounted to 3 per cent. They had used about 300 tons of coal, and had realized for tar, sulphur, and coke, £482 in excess of the previous year. There was also an increase in the item of sundries. The expenditure on wages showed an increase which they would be aware was rendered necessary by the increased quantity of gas manufactured. There was also a slight increase in rents and rates. Repairs showed £1631 increase, and under this head they had spent more than usual. It was, however, necessary to keep the works in a state of efficiency, and that, he believed, had been done. Law charges showed £259 increase. As he told them last year, that was owing to an action, to defend which they could not avoid, inasmuch as it touched upon their rights to meddle with the streets. Upon the whole, they would see the report and balance-sheet showed a satisfactory state of affairs, and he did not know that there was any public Company in the North which stood in a better position than they did. Several matters requiring close consideration had come before the Directors, and he believed care and attention had been given to everything that had been brought before them. The new works at Hendon were now in a state of considerable forwardness. They expected they would have been finished by this time; but they were so far advanced that, should the demand for gas increase upon them in the coming winter, they would be able to get gas from them at a very few weeks notice. The Shareholders ought to be satisfied with the Company's position; and when they reflected that about two years ago they were threatened with extinction, from two separate causes, and that they still lived, he thought they would agree with him that the least they could do was to be thankful. One cause had disappeared altogether. The Corporation had given a hint that they wished to become the owners of the gas-works. Well, time went on, and there was a recalcitrant Water Company on the Tees, who thought it better to have the sanction of Parliament before giving up their works to the Authorities claiming them, and the result had been such an array of figures as to frighten the best accountant they had in the town. At all events, they had heard nothing since of any sale to the Corporation. It might be that they thought it would be a bad bargain, with the electric light flashing on them at no great distance. He, however, had no fear of the electric light coming into competition with them, as far as regarded the supplying of domestic wants in the way of light or heat. That gas did not come more into use for cooking purposes, he believed was owing to the idea which seemed to prevail, particularly in the North, that nothing but a coal fire was the proper thing to have in a house. The system of cooking and heating by gas, he believed, had been adopted in the Reform Club in London, and it was there found to be the cleanest and the most suitable. If he was asked why he did not adopt the system himself, he should reply that it was because he did not wish to disturb the uniformity of the grates and pull his house to pieces. As to the electric light, out of doors it was very probable it would become the light of the future, where the cost was of little consequence, and in the ships of the Navy, where the cost was of no consequence whatever, as it had to be paid by the taxpayers. The Chelsea Vestry had recently been enterprising enough to send their Surveyor to Paris to inquire into the matter, and his report had been made public. It endorsed the opinion of all who had carefully studied the subject. The light could be burnt with economy to illuminate large areas, where one or two machines would suffice to supply the force required, but in lanes and other thoroughfares it was not applicable, unless it appeared in a much improved form. The cost of lighting Sloane Street, London, with gas was 2*s.* 1½*d.* per hour with the plant already in existence. To light the same thoroughfare on the Jablochkoff system would cost £1 4*s.* per hour, in addition to an immediate outlay of nearly £5000. They would see that there was a very great difference, but far from believing that the invention had reached its limits, he had no doubt that all possible skill and science and general intelligence would be brought to bear upon the subject to lessen the cost. Still, looking, as he said last year, at the manageableness of gas for domestic purposes, they would be convinced with him that it was of great importance to have something to burn which they could light, extinguish, relight, lower, or raise, in all which circumstances the electric light was utterly valueless. He had no fear but that the Company would hold their position, at any rate during his lifetime, and he thought, during the lifetime of the youngest Shareholder present. He saw their friends, the electricians, were doing great things. Professor Edison was credited with having devised a small glass globe, which contained within itself a complete electric-light apparatus. The ball was to be swallowed by a living person, so that by the brilliant light within him the operations of digestion, &c., might be rendered visible through his outer skin. That was contained in a sober article in the *Graphic*, and he could only say with the Editor of that paper, that, if they could swallow it, the man might swallow the apparatus too. A man had only to swallow five or six of these lamps and he would become a walking star. He believed, however, the time was a long way off when the electric light could be applied to the lighting of streets and houses, and he did not think it could be put in competition with gas for ordinary purposes. He might mention that the gas manufactured by the Company, during the year ending the 30th of June, had been 331,870,000 cubic feet, as compared with 322,231,000 cubic feet in the year ending the 30th of June, 1877.

The report was adopted.

Mr. T. Davison moved—"That a dividend of 5 per cent. be declared upon the original stock of the Company, and of 4¼ per cent. on the additional capital for the half year ending the 30th of June, 1878, payable on the 14th inst.; and that the sum of 5*s.* per share be paid at the same time on account of arrears of dividend on the original stock of the Company." He said he had no doubt every one present would be very ready to support such a resolution as that.

Mr. Wilson seconded the motion, which was agreed to.

Alderman Alcock moved—"That the retiring Directors, Messrs. Robert Vint, A. Thistlethwaite, William Armstrong, and J. J. Allison, be re-elected." As he had remarked on previous occasions, when moving similar resolutions, the report of the Company said all that was necessary in support of the re-election of these gentlemen. He might mention in regard to the admirable speech of the Chairman respecting the virtues and uses of gas, that he had omitted one purpose to which it had been extensively applied—gas-engines. He had seen a good deal of them, and could say that for small purposes it was the cheapest and most easily applied of any power that could be applied to engines. He believed gas-engines would in future become very extensively used.

Mr. J. Richardson seconded the resolution. Alluding to the electric light, he said there was a large iron manufactory in a neighbouring borough where it had been tried. At that manufactory, during the last twelve months, the gas bill had been greater than it had ever been before. Men who were working in certain parts of the shop were compelled to have lights in certain positions, and gas had then to be used.

The Chairman said he had intended to mention the circumstance, but had forgotten. He had heard it said that a man under a boiler in the shade of the electric light was in such pitchy darkness that he could not work at all.

The resolution was carried unanimously.

Mr. R. Vint returned thanks, and, alluding to the manner in which the works of the Company were carried out, said he believed their Engineer (Mr. Hawksley) had had more experience in work of that sort than any man living, and he had pronounced the Sunderland Gas Company to be a very well-managed concern. He also alluded in a complimentary manner to the way in which Mr. J. H. Cox, the Secretary and Manager, discharged the duties appertaining to his office.

Dr. YELD moved that Mr. H. G. Armstrong be re-elected an Auditor of the Company.

Mr. OLIVER seconded the motion, which was agreed to.

Votes of thanks to the Chairman and Board of Directors terminated the proceedings.

After the meeting of the Company Mr. Bulman offered for sale, by auction, 500 shares of £5 each (maximum dividend limited to 8½ per cent.), being part of the "additional capital" authorized to be issued by the Sunderland Gas Act, 1875. The shares were to be entitled to dividend from the 1st day of July last, and registered in the name of the purchaser without charge. There was a large attendance, and the whole of the shares were cleared off in a very short time. A large number were sold for £9 per share. The last lot, consisting of 22, were secured for £8 17s. per share. The average price realized was £8 19s. 9d. per share, as against £9 at the last sale.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

The following is the Directors report for the half year ending the 30th of June, submitted to the half-yearly meeting of the Shareholders of the Company, which was held last Friday, at the London Offices, 29, St. Swithin's Lane, E.C.:—

The Directors have great pleasure in placing before you the accounts for the half year ending June 30, 1878, and in reporting a generally satisfactory result of the working for that period.

In comparison with the corresponding portion of the year 1877, there has been a corresponding increase in the quantity of gas sold; but with regard to residual products there has been a larger sale with less money realized.

The Directors have also to report that satisfactory progress has been made with the construction of the new tank and gasholder at Hove, and that several extensions of mains have been made for the supply of gas to the numerous buildings which have been recently erected in the western districts of the Company. A new independent main from the works at Portslade to the gasholder station at Hove has been partly laid, and will shortly be completed.

The Directors recommend the declaration of the following dividends:—Upon the original shares at the rate of 10 per cent. per annum; upon the A shares at the rate of 7 per cent. per annum; upon the B shares at the rate of 6 per cent. per annum, all free from income-tax.

In consequence of the retirement through ill-health of the late Chairman, W. Liddiard, Esq., the Directors have elected as a Director (subject to confirmation by the Proprietors at this meeting) Mr. Frederick Fuller, who has long been connected with the Company as one of the Auditors. The Proprietors are, therefore, required at this meeting to elect an Auditor as successor to Mr. Fuller.

Dr.—*Profit and Loss, for the Half Year ending June 30, 1878.*

To Coals		£12,181 6 10
Purifying materials and process		319 2 8
Repair and maintenance of meters, mains, service-pipes, and other works		1,784 10 2
Wages		4,425 5 2
Lamps—providing, lighting, extinguishing, cleaning, and repairing		214 10 0
Rent, rates, and taxes		835 6 11
Salaries, Collectors commissions, and payments to Directors		2,444 5 11
Interest on loans		1,113 16 0
Professional charges and incidental expenses		96 8 1
Estimated discounts and bad debts on rental		94 15 2
Dividends paid to Proprietors, viz.—		

On Capital.

Per Cent.	Paid Up.	Class.	Raised under Act.	Amount.	
10	£100,000	Original ordinary	Vic. 2, c. 38	£5000 0 0	
7	37,500	A ordinary	,, 29, c. 184 ,, 38, c. 169	1312 10 0	
6	50,000	B preference	,, 29, c. 184	1500 0 0	
					7,812 10 0
Amount carried to reserve-fund					4,309 5 1
Ditto capital in trade					1,789 15 4
Balance carried to next half year's account					9,384 0 7
					£46,804 17 11

Cr.—*Profit and Loss.*

By Balance brought from last half year's account	£15,167 19 6
Sale of gas	26,079 6 10
Coke and breeze	3,360 9 11
Tar and other residuals	2,197 1 8
	£46,804 17 11

Dr.—*Balance-Sheet.*

To Capital raised under Act—		
Vic. 2, c. 38, original ordinary shares	£100,000 0 0	
Vic. 29, c. 184, Vic. 38, c. 169, A ordinary shares	46,250 0 0	
Vic. 29, c. 184, B preference shares	50,000 0 0	
		£196,250 0 0
Debenture stock		45,000 0 0
Reserve-fund		10,000 0 0
Capital in trade		8,000 0 0
Amount owing by Company		1,475 12 6
Unclaimed dividends		0 11 2
Balance, as above		9,384 0 7
		£270,110 4 3

Cr.—*Balance-Sheet.*

By Cost of works to Dec. 31, 1877	£238,916 15 6	
Ditto (add extensions made during the half year)	6,481 17 1	
		£245,398 12 7
Amount owing to the Company for gas, coke, residual products, &c., exclusive of estimated bad debts		12,600 6 10
Coals in stock		5,609 18 3
Residual products and other stocks		746 14 0
Cash in hands of Treasurer, Cashier, &c.		5,754 12 7
		£270,110 4 3

Proposed Appropriation of Profit.

September, 1878.—Dividend for half year on share capital—		
On original ordinary shares, at 10 per cent. per annum	£5000 0 0	
On A shares, at 7 per cent. per annum	1618 15 0	
On B preference shares, at 6 per cent. per annum	1500 0 0	
		8,118 15 0
Balance forward		1,265 5 7
		£9,384 0 7

NEWMARKET GAS COMPANY.—The annual meeting was held on Friday, the 23rd ult., when the report and the statement of accounts and balance-sheet for the year ending July 31 were considered and confirmed. A dividend of 10 per cent. was declared, and the surplus was placed to the reserve-fund. The retiring Directors, Messrs. R. Stephenson, C. Diver, and G. Saich, were re-elected. The Chairman said that the Directors, wishing to give the consumers a share of the benefits of their prosperous state of affairs, had, during the last quarter, reduced the price of gas to 5s. per 1000 feet, consequently, the Shareholders must be prepared for some diminution of profits in the current year. The affairs of the Company are in a highly prosperous state, and in striking contrast to the condition a few years since. A vote of thanks was passed to the Chairman and the Directors, and to Mr. Wilkinson, the Manager.

LEA BRIDGE DISTRICT GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on Tuesday last, the 3rd inst., at the London Offices, Jeffrey's Square, E.C., when the following report of the Directors was adopted, the dividend therein recommended being declared:—

The Directors have pleasure in presenting to you the accounts of the Company for the half year ending June 30, 1878.

The Directors have also the pleasure of reporting that the Bill promoted by them in the late session of Parliament has received the Royal Assent and has become law. Immediately after the passing of the Bill, notice was given that on the 1st of July the price of gas to private consumers would be reduced to 3s. per 1000 cubic feet.

In order to meet the increasing demand for gas in the districts supplied by the Company, the Directors have undertaken considerable enlargements and extensions of mains, and are making some important additions to the works at Lea Bridge.

Under the provision of the special Act, the Directors at this meeting retire from office, but, being eligible, they offer themselves for re-election. The present Auditor, Mr. W. Westcott, also retires, and offers himself for re-election. In consequence of the incorporation of the Companies Clauses Act, 1845, the Proprietors are at this meeting required to elect a second Auditor.

From the profits earned the Directors recommend the declaration of a dividend for the half year at the rate of 7 per cent. per annum, free of income-tax, payable on Tuesday, the 17th inst.

Dr.—*Revenue Account, for the Half Year ended June 30, 1878.*

To Manufacture of gas—			
Coals, including all expenses	£1417 15 4		
Purifying material	24 0 0		
Salary of Engineers	112 10 0		
Wages	280 15 2		
Repairs and maintenance of works and plant	224 8 11		
		£2059 9 5	
Distribution of gas—			
Salary of Light Ledger Clerk	£35 0 0		
Repairs and maintenance of services	8 0 0		
Repairs and renewals of meters	24 12 4		
		67 12 4	
Public lamps, for lighting and repairing		67 5 0	
Rents, rates, and taxes—			
Rents	£105 0 3		
Rates and taxes	157 5 0		
		262 5 3	
Management—			
Directors allowances	£200 0 0		
Salary of Secretary	65 0 0		
Collector's commission	86 5 3		
Stationery and printing	37 10 9		
General establishment charges and incidentals	41 12 10		
Auditor	10 10 0		
		440 18 10	
Bad debts		25 5 3	
Total expenditure		£2922 16 1	
Balance carried to profit and loss account		1770 0 4	
		£4692 16 5	

Cr.—*Revenue Account.*

By Sale of gas—		
Common gas (per meter), 11,604,000 cub. ft, at 5s 6d.	£3191 0 0	
Public lighting and under contracts	681 19 6	
	£3872 19 6	
Rental of meters	81 14 0	
		£3954 13 6
Residual products—		
Coke	£521 3 2	
Tar	134 3 5	
Ammoniacal liquor	67 16 4	
		723 2 11
Rents receivable		15 0 0
		£4692 16 5

DERBY GAS COMPANY.

The Half-Yearly Meeting of this Company took place on Saturday, the 31st ult.—Mr. G. GASCOYNE in the chair.

From the printed statement of accounts, which was read, it appeared that the profits for the half year ending June last had been £7063 4s. 11½d. The Directors proposed to pay a dividend on 2400 original shares at £1 5s. per share, making £3000; dividend on 2400 new shares at 7 per cent., amounting to £1574 15s. 11d.; leaving a sum of £2488 9s. 11½d. as undivided profits.

The CHAIRMAN, in moving the adoption of the accounts, congratulated the Shareholders that such a large sum remained to be handed over to the next half year's balance, and said that under such favourable circumstances he should reduce his remarks almost to *nil*. But it seemed impossible to avoid saying a few things. The amount of undivided profits was much larger than they could hope them to be the next half year, because of certain works and extensions in progress, and which, when paid for, would reduce the available income very considerably; but they would not create such an expenditure as would in any way interfere with the ordinary dividend. A short time since he had referred to the case of Sheffield, where gas was 1d. per 1000 feet cheaper than it was in Derby. Sheffield was supposed to be the cheapest place in the country for gas, but he thought that, without being very extravagant, they might manage to take off the 1d. in Derby.

Mr. W. T. SHAW seconded the motion, which was passed.

Mr. C. HAWKSLEY, in response to an invitation of the Chairman, said the works had been sustained in a very satisfactory manner. He had given careful consideration to the whole of the undertaking, and could assure the Shareholders that it was being arranged in a very efficient manner by the Directors and the Officers.

A vote of thanks having been passed to the Board,

The CHAIRMAN, in reply, said the Shareholders should not have cause to find fault with their sedulousness. They were indebted to their Engineers for the financial and practical position of their works. The Board carried out their behests, and were glad to find that the results were satisfactory to the Shareholders.

This brought the meeting to a close.

SCARBOROUGH GAS COMPANY.

The Annual Meeting of this Company was held on Saturday, Aug. 24, when the following report was submitted and approved of:—

The Directors of the Scarborough Gas Company, in presenting the accounts for the year ending June 30, 1878, have pleasure in reporting that the receipts of the Company, from every source, show a considerable increase over the preceding year.

The balance of the revenue account, after paying all charges, and writing off all bad and doubtful debts, amounts to £6403 19s. 11d. Deducting the half year's interim dividend paid in March last, a balance remains of £3206 0s. 0½d., which enables the Directors to pay the maximum dividend to each class of Proprietors, and leaves a small balance of £8 0s. 1d. to carry to the contingent-fund, which will then amount to £3875 14s. 5d.

The extension of mains referred to in the last report, and which, with the new retort-house, received the sanction of the Proprietors, has been carried out so far as the present necessities seem to require, and a more ample supply of gas will be afforded to the several localities. A contract for the new retort-house and additional storeage accommodation has been entered into, and the works are now in progress. The amount of the contract is £10,228 5s.

The demand for gas continues to increase, and the additional revenue thus derived, and a more favourable contract in the price of coals, will, it is hoped, enable the Directors before long to make a further reduction in the price of gas, without affecting the interests of the Proprietors. An unusually large item appears in the revenue account for renewal of retorts, which will not occur again to the same extent.

Three of your Directors retire from office by rotation—viz., Mr. A. Clapham, Mr. Edward H. Hebden, and Mr. G. P. Dale, who are all eligible for re-election.

The retiring Auditor is Mr. Hawson Herbert, who is eligible for re-election.

Dr.—*Revenue Account, for the Year ending June 30, 1878.*

To Gas manufacture, &c., viz.—			
Coal		£9483 2 11	
Lime and oxide	£234 5 3		
Less, refuse lime sold	37 0 5		
	197 4 10		
Water	33 12 0		
Wages	2715 5 1		
Cartage	38 2 2		
Sundries, oils, brushes, shovels, tools, &c.	290 3 8½		
		£12,757 10 8½	
Lamp department, &c., viz.—			
Repairs and renewals of lamps	£166 15 3		
Lamplighters wages	424 10 4		
		591 5 7	
Repairs, &c., viz.—			
Repairs, renewals, and inspection of meters	£351 8 4		
Do. general	352 17 4		
Do. renewals of retorts	1026 7 11		
Do. renewals of mains and services	534 12 2		
		2,245 5 9	
Charges, &c., viz.—			
Rates and taxes	£662 12 8		
Salaries	872 0 0		
Printing, stationery, &c.	52 3 2		
Incidentals	70 11 4		
Income-tax	87 0 6		
Insurance	41 19 9		
Directors remuneration	200 0 0		
Auditing the Company's accounts, 1876 and 1877	15 0 0		
		2,000 18 5	
To Interest, &c., viz.—			
On preference stock	£1367 3 0		
Mortgages and loans	1226 15 8		
For bank charges	246 0 0		
		2,839 18 8	
Overcharges and allowances		14 1 0	
Discounts to large consumers		272 17 10	
Bad debts written off rentals		51 4 2	
Interim dividend, Dec. 31, 1877		3,197 19 11	
Balance		3,206 0 0½	
		£27,177 2 1	

Cr.—*Revenue Account.*

By Gas and meter rents, public lighting, and other contracts			£21,687 13 8
Residuals, viz.—			
Coke	£2983 16 5		
Tar	1569 2 11		
Ammoniacal liquor	602 7 11		
		5,155 7 3	
Interest received from Messrs. Peacock and Hart, on overdue purchase-money, to Oct. 6, 1877		92 18 11	
Interest on overdue purchase-money due from Messrs. Peacock and Hart, June 30		237 14 9	
Transfer fees		3 7 6	
		£27,177 2 1	

WREXHAM GAS COMPANY.

The Annual Meeting of this Company was held on Tuesday, Aug. 27—W. Overton, Esq., J.P., in the chair.

The Secretary (Mr. T. Walker) read the following report of the Directors:—

The expenditure upon capital account during the year amounts to £1090 13s. 10d., principally for new main and service pipes laid in newly-formed streets in the Hirdir and Rhosddu. It also includes a portion of the cost of a larger main from the Town Hall to the gate leading to the Great Western Railway Station.

A piece of land adjoining the Company's works being offered for sale at a reasonable rate, your Directors considered it desirable to purchase a portion of it, which they could not before obtain.

In September last a call of £1 per share was made upon the new issue of 500 shares, and one of a similar sum (making £3 per share called up) is payable on the 30th inst.

To show the increase in the Company's business, it may be stated that the annual consumption of gas has doubled in nine years.

The numbers of additional consumers added to the rental during the year has been 56.

In consequence of the reduction in price, there has been a slight decrease in the amount received for gas supplied, and owing to the mildness of last winter, and the depression in trade, the increased consumption has not been so large as in previous years. And, from the same causes, coke has been sold at greatly reduced rates to lessen the accumulated stock.

An interim dividend at the rate of 5 per cent. upon consolidated stock, and 3½ per cent. on shares, for the half year ended the 31st of December last, has been paid, and it is now recommended that a similar dividend be declared for the half year ended the 30th of June last. After paying this dividend there will be an available surplus, out of which it is proposed to pay a further dividend for the year 1873 at the following rates:—namely, 2½ per cent. upon stock, and 1¾ per cent. upon shares, making for that year 7½ and 7 per cent. respectively.

It is with regret your Directors have to record the death of one of their colleagues, Mr. Joseph Jackson, who was for many years a member of the Board, and during a portion of the time took an active part in the supervision of the works as Managing Director. At the annual meeting in 1875, it was resolved that the number of Directors be reduced, and for this reason your Directors have not exercised the power given them of filling up the vacancy, and they recommend the Shareholders at this meeting to pass a resolution reducing the number to seven.

Messrs. Overton and A. W. Edwards are the Directors, and Mr. William Jones the Auditor, who retire by rotation; they are all eligible for re-election.

The Chairman moved the adoption of the report, and in the course of his remarks stated that the illuminating power of the gas had been well sustained throughout the year, having been, during the whole of that time, two candles above what was required by the Company's Act of Parliament.

Mr. E. Jones seconded the motion, which was carried.

Mr. T. Bury moved, and Mr. W. H. Taylor seconded, a resolution that the number of Directors be reduced to seven.

Mr. E. Rowland moved an amendment, which was seconded by Mr. R. Parry, that the number remain as at present.

On a division, 5 voted for the amendment and 12 for the motion, which latter was carried.

The retiring Directors—Messrs. Overton and A. W. Edwards—were re-elected, and Mr. W. Jones was re-elected Auditor.

The interim dividend paid in March last was confirmed, and a further dividend was declared for the past half year, at the rate of 5 per cent. upon consolidated stock, and 3½ per cent. upon shares, making respectively 10 and 7 per cent. per annum. A back dividend for the year 1873, at the rate of 2½ per cent. upon stock and 1¾ per cent. upon shares, was also declared out of the surplus profits.

A cordial vote of thanks to the Chairman and Directors closed the proceedings.

DERBY WATER-WORKS COMPANY.

The Half-Yearly Meeting of Shareholders was held on Friday, Aug. 30—Mr. G. Gascoyne in the chair.

The Secretary (Mr. Walker) having read the notice convening the meeting, the following report was taken as read:—

The Directors of the Derby Water-Works Company, in presenting a statement of accounts for the half year ending June 30, 1878, have to report to the Shareholders that, in consequence of a general depression in trade, almost unexampled in continuance and severity, the income of this Company has not altogether escaped its effect; and that portion of the receipts connected with the supply of water for purposes of manufacture and trade has been diminished somewhat beyond what had been anticipated. With the return, however, of improved commercial prosperity there can be little doubt of a corresponding recovery from the temporary depression thus occasioned.

The gross receipts are £6906 0s. 8d., being £623 13s. 5d. more than the receipts in the corresponding half year of 1877.

The revenue expenditure is £4059 2s. 9d., being £289 2s. more than the expenditure in the corresponding half year of 1877.

The realized profit available for dividend is £2896 17s. 11d., which is £334 13s. 5d. more than the profit of the corresponding half year of 1877, and with the aid of £1233 2s. 1d. from the contingent-fund, the Directors are enabled to recommend a dividend of 7 per cent. on both classes of shares, amounting to £4130, at the same time leaving a reserve-fund of £851 15s. 9d.

The large outlet drain from the upper reservoirs, so long urgently needed, has at length been formed into the Breadsall Brook, and, beyond some ordinary repairs required by the old engines, the machinery and plant are in a condition thoroughly satisfactory to the Engineers.

The Chairman proposed—"That the report of the Directors and balance-sheet of the Company's accounts for the half year ended June 30, 1878, be received, approved, and adopted." He said that this was the sixty-first half-yearly meeting, the Company having existed 30½ years, and this was the twentieth meeting since they obtained the Act which authorized their new undertaking, and gave them a new era in their existence. He must confess for himself, and he thought he was speaking for the Directors generally, that they were a little disappointed at the slow financial progress that had been made in the Company's affairs in the past half year. However, that was easily accounted for, and no doubt the endurance of this state of things would not be long. Those who had toiled as the Directors had done during the last ten years, with the assistance of their able Engineers, in designing and executing the valuable works they now possessed, could, of course, feel no reward so great as seeing their efforts crowned by financial, as well as by practical, success, to the whole extent which Parliament allowed to companies, or those who came forward patriotically and catered for the public good where the public had omitted or neglected to cater for themselves. There was no doubt that, had not the Derby Water Company, 30 years ago, taken the step they had, water—that important article—would have been denied to the town for years, and there was no reason whatever for them to feel that they were not, in every sense, entitled to the benefits of the highest dividends that Parliament permitted. But they must look at facts as they existed. In discovering any deficiency in the balance-sheet, the Directors must be allowed to plead the widespread and calamitous depression of trade and commerce which prevailed just now, and which accounted for almost all the difference which was perceived in the accounts this half year. That widespread depression had extended to all trades, to all commerce, and to all classes of the community alike, and was being at this time deplored everywhere. The railways and other companies were affected, and he thought there were none but what were affected more or less, if not in the declared dividends, in the balance carried forward to the next account. Each one of the Shareholders having had a balance-sheet, he did not deem it necessary to enter minutely into the figures; but he could not help pointing out that they were £623 better than in the corresponding half year, and, indeed, for the last whole year. They were £623 better in gross receipts, and although there was an increased expenditure of £289, they still had a balance in their favour of £334 more than in the corresponding half of last year. These were signs and proof of growth and elasticity. The Shareholders would doubtless have noticed that the increased expenditure was one of the features of the last balance-sheet, but that could be easily accounted for; £35 was for rates and taxes, over which they had no control; law expenses and damage to land—all of which damage was now over, and could not occur again—£21; the interest on outlying capital, £135; additional salaries for servants whose appointments were of supreme necessity, £281; and there was an important item of £150 expenditure incurred in pulling up old and replacing new mains in certain streets, a work which was done prematurely in anticipation of them being repaved. Those items gave an expenditure of £622, which far more than accounted for the increased expenditure of £289 during the half year. It was stated at the meeting twelve months ago that the Company probably would require five half years to establish an equipoise between expenditure and income, owing to the demand upon their resources by the increase of capital. Only two half years had at present passed over, and, therefore, there was still a reasonable margin within which the Directors hopes might be realized, for what had they not already accomplished? He had been accustomed to state sometimes at their meetings the number of new houses, shops, gardens, &c., supplied with water. During the last year there had been 1291 such—a very important improvement indeed, considering the bad times, and that not only fewer houses and properties were erected, but that there was also less likelihood under such circumstances of having the water laid on. The great drawback of all, however, was the bad trade, which withheld a very great amount from their funds. With a return of trade he was sanguine of the revenue recovering speedily, and he had no doubt the dividends would then be perfectly satisfactory. He had stated on former occasions that, as far as he himself was concerned, he was a Shareholder from the beginning of the Company, 30 years ago. He had never sold a share, and should not now do so. He stated that as a measure of his own confidence, and what he stated he believed. When the Company were just formed the Shareholders went five years without a shilling of dividend after the deposit was made, and two years after the whole of the capital was called up, and when at length they did commence to pay the first dividend, 2 per cent. was all they received. But affairs since then gradually began to improve. They had been able to establish works on Breadsall Hills, which were capable of supplying water to the highest premises in the town of Derby. Before they had the new works the supply was unsatisfactory, but now it was satisfactory in the highest degree, and there was no question that they had only to wait for a time for the development of the revenue, and in all reasonable expectations there would be an early change for the better. He next made a comparison between the rate at which water was sold in Derby and in some other towns, showing the cheapness of the Derby water. Manchester water he said was three times dearer than Derby water, and yet the Derby Company during the past year had only made a deduction of £800 from their dividends. And whatever deduction was made from the dividends, it was only a deduction of one-third on that portion of the capital entitled to a dividend of 10 per cent. The dividends of that entitled to 7 per cent. had not been reduced. He called attention to these facts in order that the meeting might look at them calmly and fairly, so that they might see that though there was a loss they could not be disappointed as Shareholders, because they were still in the ascendant, in expectation and certainty of future success. The works supplied water of good quality and in abundance to the town and district, and universal evidence had hitherto been given of its excellence. But the

great evidence of all was the vast preference given to it by the public at large, and that was sufficient to establish its worth and its value. They might dwell upon every one of the points he had briefly alluded to, but if they talked for a week they could not say more than that their prospects were perfectly good and as sound as ever, and there was no reason why they should not be fairly satisfied with the present dividends, and pass unanimously the resolution he had proposed.

Mr. HUISH seconded the motion.

Mr. MUSSON said he had been interested from time to time in the Chairman's statements, and he believed that very best care and attention had been exercised in conducting the business of the Company, which to his mind was very satisfactory. On the other hand, he must say that he was dissatisfied with one part of their proceedings. He had for some time looked very interestedly at the contingent-fund, and he did not like to see it meddled with. He had always been dissatisfied with the process that had been going on for the last five half years—of taking from that fund certain amounts, which now amounted to £6404, in order to bolster up the dividends of the Company, and make a payment of 7 per cent. For his own part he should have been exceedingly glad and quite content to receive a dividend as far as the revenue itself would afford, and no more. He maintained that was a correct, sound, and proper principle to be adopted, as he supposed the contingent-fund was formed to meet cases of emergency, but if the Directors drained it in that way, and one of their reservoirs were to burst, or anything of the kind were to happen, they would not have a shilling to fall back upon. He looked upon the contingent-fund with great complacency, and it was an agreeable surprise to find it was not yet exhausted. He should like to know from the Directors whether they would promise that, when the revenue improved—and he quite agreed with the Chairman that they must be patient and take time into partnership, and there would be no doubt that it would right itself—and they had sufficient income to pay the statutory dividends without dipping into the contingent-fund, would they engage to repay those sums which they had taken from time to time to make up dividends in past years? He knew they were legally entitled to use the fund for the purpose to which they had applied it, but it was not always the wisest thing to do, entirely and completely, what one had the power to do, and he, for one, believed that no dividends ought to be paid except out of the balance of revenue. The dividends had been made up this half year by taking from the contingent-fund, and he wished to be informed whether the whole sum taken from that fund (£6404) would be repaid when times were more favourable.

Mr. HAWKSLEY (the Engineer of the new works) said the last speaker was in error as to the object of the contingent-fund. It really was not a fund applicable to capital purposes at all, but was simply the surplus revenue of one period carried forward to meet any deficiency that might arise in the revenue at another period. The Directors had been doing nothing more than was contemplated by the Act of Parliament, and nothing more than any prudent man in business would do. If a man made an extra profit in one particular year, he did not immediately spend it, but placed it aside to fall back upon in a period of depressed trade.

Mr. MUSSON said he was quite of opinion that the Directors had acted legitimately in regard to the fund. He also believed that with the growth of the town there would be such a revenue that they would have no difficulty in paying what they engaged to pay. Supposing the contingent-fund grew and increased every year, and they could not control it—supposing it got too big and unmanageable, what then?

The CHAIRMAN said they would then reduce the price of water. The Directors had determined, if possible, that there should be no reduction in the reserve-fund. They considered, as Mr. Musson did, that it was prudent to maintain the fund, and they were of opinion that the £851 that was left of it should remain in the fund. They hoped the revenue would so increase that they would be able to add to the reserve-fund, and make it of the same amount as before. The Directors respected the principle Mr. Musson had mentioned, and they would endeavour to carry it out. He would, however, wish to remind him that had they not dipped into the reserve-fund, but only paid such dividends as the revenue would afford, they would have been wounding the interests of the widow and the orphan Shareholders, those who could not afford it. There was such a thing as creating a panic, and there was such a thing as taking an equitable course, by striking a balance which should please all and offend none.

Mr. ANDERTON said he wanted to know how it was that the Shareholders at the present moment were receiving less than the statutory dividends and the price of water was not raised. The Chairman had stated that Manchester people paid two-thirds more than they did in Derby, and he took it as being very hard that he should buy shares at £59 10s. and receive only 7 per cent.

The CHAIRMAN said it appeared that Mr. Anderton regretted that the Directors did not, whilst reducing the dividends, raise the price of water. Had he considered what a serious thing it would be to raise the price of water to consumers? The Directors disliked to raise the price, and they thought their difficulties were not yet so great as to drive them to do it. As to making a deduction of dividend, they were obliged by Act of Parliament to make it upon the 10 per cents. If they were unable to pay 7 per cent. on the original shares, then a deduction would be made upon the other class of shares. No deduction had up to the present been made on the 7 per cents.

The resolution was then put and carried unanimously.

On the motion of the CHAIRMAN, seconded by Mr. RICHARDSON, a dividend of 7 per cent. on each class of shares was declared.

Dr. GOODE moved that a vote of thanks be given to the Chairman, Directors, and Auditors for their services during the past half year. He said he thought the majority of Shareholders would feel quite contented with the report presented by the Directors. They were aware that there had been a depression of trade during the last half year, but he thought the progress made by the Company was as much as might be expected. As to the condition of the water, he happened to have examined it occasionally. He had no regular analysis to bring forward, but he had occasionally examined the water with regard to its organic purity. He made one or two examinations last year, and one or two this year, and he thought the results showed that the purity of the water had been maintained. He had been satisfied of the purity of the water for a number of years. The process he subjected the water to was the Wanklyn analysis, and the results were as follows:—

Water.	Parts per Million. Free Ammonia.	Albuminoid Ammonia.
May, 1877	0·027	0·09
August, 1877	0·010	0·07
April, 1879	0·020	0·045
August, 1878	0·015	0·070

The analyses showed that in the autumn of last year the water became purer, as it usually did in the summer time. In the spring of this year the free ammonia was less than the spring of last year, and instead of 0·027 it became 0·020. The analysis showed a high degree of purity, and he found only one or two wells in Derby holding water of the same purity. He found the well of St. Alkmund's very pure, but the Company's water, with one or two exceptions, was the best in the town. He thought they ought to be contented with the results of their filtering apparatus.

Mr. WOODWARD seconded the resolution, which was carried unanimously.

Mr. BOAM said he wanted to know when the certificates for the new shares would be issued, and whether the Corporation had made any offer for the purchase of the works.

The SECRETARY said the certificates would shortly be ready for those who wished to have them.

The CHAIRMAN said in answer to the other part of the question no offer had been made on the part of the Corporation to the Company. There was a communication made to the Board, but the Company's undertaking not being on sale, the Directors declined to enter into negotiations. With reference to the vote of thanks proposed, he was very much obliged on behalf of the Directors and himself. The Shareholders might rest satisfied that they had attended most assiduously to the duties which they were called upon to perform. He was very pleased with Dr. Goode's analysis, coming as it did so unexpectedly and opportunely. From a lecture recently delivered at the School of Science, by Dr. Coyle, it would appear that the water in some of the wells at New Normanton was very bad, and in comparison the Company's water was excellent indeed.

The meeting then terminated.

WREXHAM WATER-WORKS COMPANY.

The Annual Meeting of this Company was held on Wednesday, Aug. 28—W. OVERTON, Esq., J.P., in the chair.

The SECRETARY and MANAGER (Mr. F. Storr) read the notice convening the meeting, and the following report was presented:—

The expenditure on capital account, amounting to £10,732 1s. 3d., has been incurred chiefly in the completion of the new reservoir and works at Cae Llwyd, and the extension of the Company's service to meet public requirements.

The water account for the year shows an increase as compared with last year of £315 2s. 9d.

The total receipts for the year for water and profit upon fittings amount to £3153 18s. 9d. After payment of the usual charges, the preferential dividend at 5 per cent., the interim dividend at 6½ per cent. per annum for the half year ended December, 1877, and interest upon the mortgage debt for the year ended June 30, 1878, a balance remains on net revenue account of £1480 5s. 4d.

The Directors, therefore, have pleasure in recommending the declaration of the second half year's dividend at the rate of 6½ per cent. per annum (free of income-tax) upon the consolidated stock and ordinary shares, and at the rate of 5 per cent. upon the preference shares, leaving a balance of £353 17s. 3d., out of which the Directors propose to carry £250 to the reserve-fund, leaving £103 17s. 3d. to be carried forward to the next account.

During the year water has been laid on to 280 dwelling-houses, making a total of 2677 now supplied.

The storeage reservoir at Cae Llwyd is completed, and in successful operation. To the Directors, who have viewed with deep interest the progress of these works, their completion is a source of great satisfaction, as the Company is now placed in an independent position, and enabled to meet the growing wants of the district.

Applications from various parts of the district are being constantly received for supplies, and further arrangements have been made with His Grace the Duke of Westminster for the extension of the present service to Poulton.

The 300 ordinary shares, part of the capital authorized by the Act of 1864, being now fully paid up, the Directors have converted the same into consolidated stock, as authorized by the Proprietors. The certificates will, therefore, be called in and cancelled, and in lieu thereof certificates for an equivalent amount of stock will be issued.

The retiring Directors are Messrs. Peter Walker and William Low; both are eligible for re-election.

William Jones, Esq. is the retiring Auditor, and is eligible for re-appointment.

The CHAIRMAN moved the adoption of the report, and said that the completion of the reservoir at Cae Llwyd had placed the Company in an independent position as far as related to their storeage and supply of water. The progress of the construction of the reservoir had been a most anxious time to the Directors, and it was a great relief to them to be able to report to the Shareholders that it had been completed. The construction of works of that magnitude in such a situation was always attended with risk, and the construction of this reservoir had not been an exception. At one stage of the progress of this work a fault had been discovered, which rendered it necessary that they should excavate to a greater depth than was originally intended. Added to this, the difficulties and anxieties of the Directors were further increased by the death of the Contractor during the progress of the work. It, however, he was pleased to say, had now all been completed in a satisfactory manner, without any appearance of a leakage, and the supply of water they had been obtaining from the Ruabon Water Company would now altogether cease. The new reservoir gave the Company a storeage which was sufficient to supply their customers for 100 days, at the rate of 500,000 gallons per day, and would be found adequate to the wants of the town and neighbourhood for many years to come. The Shareholders would see by the report that the Directors proposed to carry £250 to the reserve-fund, leaving a balance of £103 17s. 3d. to be carried forward to the next account. That amount, of course, might have been used for the purpose of increasing the dividend, had it been thought advisable. Another gratifying feature was that, notwithstanding the dulness of trade, their receipts had increased £315 odd, making the rate of increase since the formation of the Company 11 per cent. He was happy also to call the attention of the Shareholders to the fact that nearly all the extensions made by the Company had been remunerative; the only exception was Gresford, where not one-sixth of the inhabitants had taken the water; but perhaps a dry summer, with the dry weather lasting a little longer than it had done during the present summer, would make a difference there.

Mr. DAVENPORT seconded the motion, which was carried unanimously.

The CHAIRMAN proposed that the second half year's dividend be at the rate of 6½ per cent. upon the consolidated stock and ordinary shares, and at the rate of 5 per cent. on the preference shares.

This was seconded by Mr. LOW, and agreed to.

Mr. LEWIS proposed that Mr. Peter Walker and Mr. William Low be re-elected Directors of the Company.

The motion was seconded by Mr. LINDOP, and carried unanimously.

Mr. WALKER briefly returned thanks, and said he had always taken a great interest in the welfare of the Company, and was much gratified to find the labours of the Directors attended with such success.

A vote of thanks to the Chairman, proposed by the Rev. T. KIRK, and seconded by Mr. A. W. EDWARDS, closed the proceedings.

LEIGH LOCAL BOARD GAS SUPPLY.

A Meeting of the Leigh Local Board was held on Wednesday, Aug. 29—Mr. GREENOUGH in the chair—when the minutes of the proceedings of the Gas Committee were presented. These stated, *inter alia*, that at their meeting on the 20th of August, a report was read by the Clerk, being a statement of the year's working of the gas department to June 30, 1878, and it was resolved—"That the Board be recommended to make a further reduction of 3d. (threepence) per 1000 feet in the price of gas to all consumers, subject to the present discounts for payment of accounts within 14 days of delivery; that is to say, the prices to be as follows:—4s. 9d. per 1000 feet, less discount of 6d. per 1000 feet, to consumers of under 200,000 feet per year (net price being 4s. 3d. per 1000 feet); 4s. 9d. per 1000 feet, less discount of 9d. per 1000 feet, to consumers of between 200,000 and 400,000 feet per year (net price being 4s. per 1000 feet); 4s. 9d. per 1000 feet, less discount of 1s. per 1000 feet, to consumers of between 400,000

and 600,000 feet per year (net price being 3s. 9d. per 1000 feet); 4s. 9d. per 1000 feet, less discount of 1s. 3d. per 1000 feet, to consumers of over 600,000 feet per year (net price being 3s. 6d. per 1000 feet)."

The minutes were adopted, on the motion of Mr. SMITH, seconded by Mr. LIMON.

The following is the report of the Clerk to the Board, referred to in the above:—

To the Gas Committee of the Leigh Local Board.

Gentlemen,—I present herewith the accounts of the gas department for the year ended June 30, 1878, made up and balanced for the purpose of the audit, which is fixed to take place on the 4th prox.

In doing so I may, for the information of the Committee, state—

That the number of the consumers of gas at the beginning of the year was		1,647
Which number has been increased during the year by		118
Making the total number of consumers at the end of the year		1,765

	Miles.	Yds.
The length of mains of all sizes laid on June 30, 1877, was	18	198½
During the year there has been added	1	737
Making the total length of mains laid	19	935½

	Feet.
The quantity of gas registered by station-meter has been during the year	31,625,100
Sold to consumers, as per gas-rental book 28,799,800	
Consumed at works 125,000	
	28,924,800
The gas unaccounted for being	2,700,300
or at the rate of 8·53 per cent. of loss.	

	Tons.	c.	q.
The quantity of coal and cannel carbonized has been—			
Coal	2,704	3	0
Cannel	403	2	0
Total	3,107	5	0

Thus showing that the gas made during the year has been 10,178 feet per ton of coal and cannel carbonized.

The average cost per ton of coal and cannel delivered at gas-works has been 11s. 1½d.

The average illuminating power of the gas supplied during the year, the Manager informs me, has been 15·8 candles. The Gas Act provides for 14 candles only.

The gas loans at the end of last year amounted to	£56,650	0	0
The loans taken up during the year being	5,900	0	0
Making a total of	£62,550	0	0
Of this sum there had been expended at the end of last year	£55,131 13 7		
Add expended during the present year	3,281 15 8		
Making a total capital outlay of	58,413	9	3
Leaving an unexpended balance of loan capital of	£4,136	10	9

The revenue account shows the gas-rental of the year to be (at 5s. per 1000)	£7,266	3	7
Coke sales	245	5	6
Tar and ammonia water	421	11	7
Rents of property	155	5	1
Profits on fittings	133	4	6
Banker's interest, less commission	108	12	9
Stock of coal, cannel, tar, and gas in holders in excess of last year's stock	4	19	7
	£8,335	2	7

The set-off against the above being as follows:—			
Discounts	£957	18	5
Coal and cannel	1,723	11	8
General expenses	59	17	2
Rates and taxes	132	2	4
Carting coal	37	19	10
Salaries	373	18	3
Stoking	363	10	3
Engine minding	23	6	0
Purifying	112	2	4
Storing coal and cannel	5	2	11
Inspecting meters	46	4	10
Repairs to mains	13	9	4
Repairs to services	28	3	7
Maintenance of works and property	208	12	3
Renewal of retorts	119	8	9
Apparatus	12	0	10
	£4,217	8	9
Leaving a residue (being gross profit) of	4,117	13	10
	£8,335	2	7

From the gross profits of	£4,117	13	10
Deduct interest on gas loans for the year	2,489	15	11
Leaves the net profits of the year	£1,627	17	11
The reserve-fund at the end of the year 1876–7 was	£3,461	12	2½
Add the profits of the year ended June 30, 1878	1,627	17	11
	£5,089	10	1½
Deduct the sum of £1000, transferred on Sept. 25, 1877, from this fund to the general expenditure account of the Board	1,000	0	0
And there remains a disposable balance of	£4,089	10	1½

It may not be improper, before concluding this statement, to remind you that the Leigh District Gas-Works were transferred from the Leigh District Gas Company to the Gas Joint Committee of the Westleigh, Pennington, and Bedford Local Boards on June 30, 1874, now four years ago, and that at the time of the transfer—

The number of consumers was	1,207
The capital expended, nearly	£48,000
The gas registered at station-meter during the last year's working of the Company . . . . . Feet.	27,872,000
The gas sold do., do. . . . . ,,	23,069,200
The loss of gas do., do. . . . . ,,	4,802,800
The per centage of loss being . . . . . Per cent.	17·2

The price of gas to all consumers alike, 5s. 6d. per 1000 feet net.

The illuminating power I have no means of stating. It was, however, such as to cause dissatisfaction to be openly expressed, and, even to this date, notwithstanding the reduction in the price of gas below referred to, the confidence and support of the public are not reinstated, there being no fewer than 500 meters not now in use.

The reduced price of fuel, and the more careful and efficient management of Mr. Timmins, have enabled the Board to reduce the price of gas from time to time, down to the present prices, viz.:—

4s. 6d. per 1000 feet net to consumers of less than 200,000 feet per year.
4s. 3d. ,, ,, between 200,000 and 400,000 feet.
4s. 0d. ,, ,, ,, 400,000 and 600,000 ,,
3s. 9d. ,, ,, over 600,000 feet.

Thus the prices have been reduced 1s. to 1s. 9d. per 1000 feet.

After the satisfactory result of the last year's working of the Board, it will remain for the Committee to determine whether or not it is expedient to further reduce the price of gas.

I am, of course, quite aware that the Committee have always considered and acted upon the principle that their and the public interest are identical.

(Signed) GEO. DICKINSON, Clerk.

REMARKS ON THE CONSTRUCTION OF AN IRON TANK GASHOLDER,

ERECTED AT THE GAS-WORKS OF GÉRARD-CHAMPS, VERVIERS, IN 1874.

[Translated from the *Revue Universelle des Mines*, &c.]

It is known that gasholder-tanks are generally built of masonry wherever the nature of the soil allows of their being sufficiently sunk, in which case the pressure of the earth backing from the outside compensates for the pressure of the water from the inside.

Under such circumstances, experience alone can show the proportions in which the weight of masonry, its cohesion, the resistance of the rammed earth to the pressure, and the nature of the cements, mortars, and compositions should contribute to secure complete stability and perfect water-tightness.

For instance, marshy lands, soils liable to land-slips, and aquiferous sands give rise to a pressure on the bed from below, making excavations if not positively impossible, at all events very costly. On the other hand, the water in certain soils is subject to changes of level, causing uneven settlements, or else the proximity of mining works near to the surface of the soil causes difficulties which render the erection of a tank in masonry extremely dangerous.

Therefore, in most cases metal tanks have been used for some time, the tanks being made either of rivetted sheet-iron or of cast-iron plates ribbed and bolted together, the joints being caulked with cast-iron cement. This method allows the tank to be built above ground, and, in case of need, avoids excavation.

Up to the present the dimensions of cast-iron tanks have not exceeded a diameter of 25 m. (82·02 ft.), or a depth of from 7 to 8 m. (22·96 to 26·24 ft.).

In fact, practically, the thickness used cannot exceed a certain limit, and, notwithstanding the use of hoop-iron bands round the outer circumference, many instances are known of these tanks bursting, although the bursting strain at the rupture of the iron did not exceed 3 kilos per square millimètre (4241 lbs. per square inch).

Towards the end of 1873, the Liége Gas Company had under consideration a design for a gasholder with a metal tank of a capacity of 10,000 cub. m. (13,100 cub. yds.), 35·80 × 10·10 m. (117·45 × 32·84 ft.), for their gas-works at Gérard-Champs, Verviers. The carrying out of this project was entrusted, in February, 1874, to M. Aug. Detombay, the able contractor of Marcinelle, near Charleroi. It was stipulated that the gasholder should be finished and ready for use by the end of September of the same year.

The cast-iron tank system was at once put aside, owing to the great thickness of the plates which would have been necessary. There remained, then, but one other method of construction—*i.e.*, with rivetted sheet iron. In making the rows of rivetted sheets 1 m. (3·28 ft.) high, and assuming the resistance to tension to be 8 kilos. per square mètre (14·76 lbs. per square yard) on the sheet when whole, omitting the weakening of the sheets through punching, we arrive at a mean pressure on the lower row of

$$35{\cdot}800 \text{ m.} \times 1{\cdot}1000 \text{ m.} \times \left(\frac{10{,}100 - 9{,}100}{2}\right) = 343{,}680 \text{ k. } (338{\cdot}6 \text{ T.})$$

and thus at a thickness of shell of $\frac{343{,}680}{2 \times 8 \times 1000}$ = about 21½ mm. (0·84 in.)

These lower rows were too thick to be easily punched, jointed, rivetted, or finished off, especially where the water-tightness of the joints was held in view. Further, the multiplicity of the joints caused by the requisite great number of iron sheets, owing to their weight, increased the danger of leakage.

The Company were, therefore, led to consider the system, already in vogue, of building a tank of thinner sheet iron. To give the sheets sufficient resisting power, they are strengthened on the outside by means of flat iron bands, angle-irons, and ⊥-irons, rivetted on to the sides of the shell.

But, as the employment of numerous butt straps and the extra rivetting of the bands increased both the expense and the danger of leakage, the following method of construction was finally decided upon, as it offered all the safety and solidity called for, and the combined advantages of minimum weight and cost, together with great facility of erection. Further, this system allows the vertical sides of the tank and bell to be put together simultaneously, when a space of 0·400 m. (1·31 ft.) is left between them. This space is sufficient to enable the men to cement with composition the interior of the tank, to insert the rivets in the bell, and to hold them up during the rivetting, which then takes place from the inside of the bell.

The lower rows of the tank, up to a height of 6 m. (19·68 ft.), were made of ordinary commercial ⌊⌋ irons 0·300 m. (11·81 in.) high, but varying in section, as shown in the accompanying table, giving the calculations of resistance. The maximum resisting strain is 8 k. (17·64 lbs.) per square millimètre (0·00155 square in.). Sheet iron commences to be used at the height at which the use of ⌊⌋ irons, at their minimum manufacturing weight, is not sufficiently small to be economical.

Letters designating the different Parts of the Tank, commencing from the Bottom.	Weight of ⌊⌋ Iron per Yard Run in Pounds.	Section in Square Inches and Decimals of an Inch.	Tensile Stress on each Side in Tons and Decimals of a Ton.	Resisting Force per Square Inch in Tons and Decimals of a Ton.	Remarks.
a	106·74	10·509	53·435	5·090	
b	106·74	10·509	51·848	4·926	
c	100·92	9·920	50·261	5·066	
d	100·92	9·920	48·674	4·907	
e	100·92	9·920	47·086	4·742	
f	90·83	8·928	45·499	5·090	
g	90·83	8·928	43·913	4·913	
h	90·83	8·928	42·325	4·738	
j	90·83	8·928	40·737	4·557	Twenty ⌊⌋ irons
k	88·28	7·936	39·151	4·932	
l	88·28	7·936	37·563	4·729	
m	88·28	7·936	35·976	4·532	
n	73·21	7·254	34·389	4·735	
o	73·21	7·254	32·801	4·519	
p	73·21	7·254	31·214	4·303	
q	73·21	7·254	30·218	4·081	
r r′ r″ r‴	73·21	7·254	28·040	3·865	
t	0·3149 in.	—	30·862	4·449	
u	0·2362 ,,	—	22·044	4·735	Three sheets.
v	0·2362 ,,	—	13·226	2·822	
Brim of cast-iron plates.					

The bottom of the tank was made of rivetted sheets, 5 mm. (0·19 in.) thick, on a diameter of 33·800 m. (110·89 ft.), and of 10 mm. (0·39 in.) on the annular crown, making the total diameter of 35·800 m. (117·45 ft.), *plus* the necessary outer lining, and was laid upon a perfectly level bed of concrete, 1·500 m. (4·92 ft.) thick.

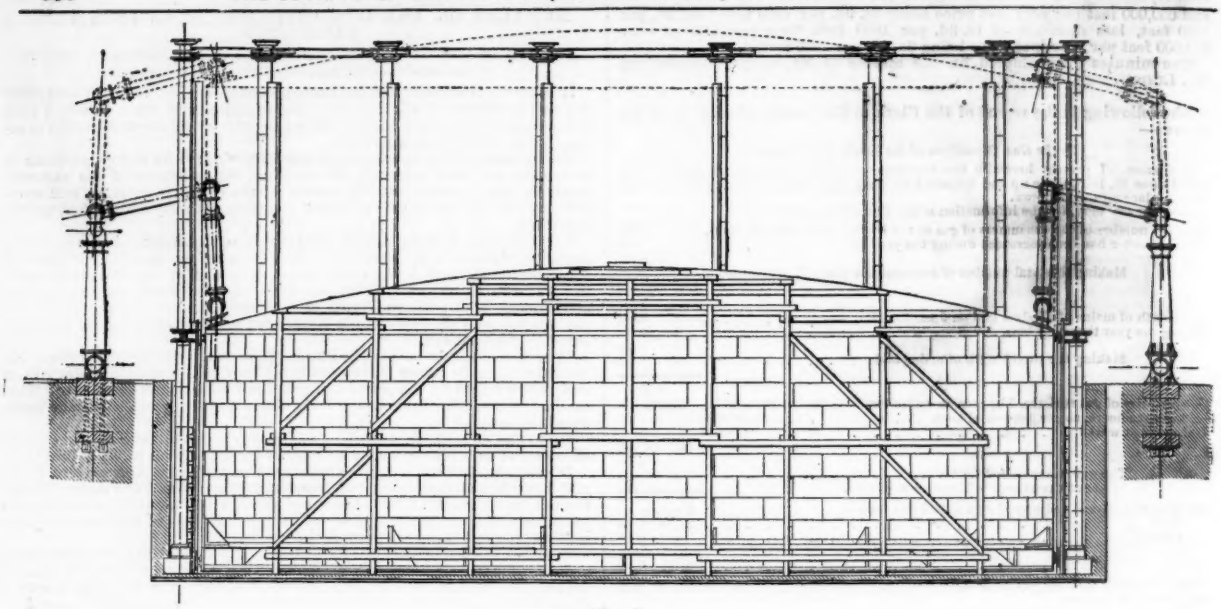


FIG. 1.

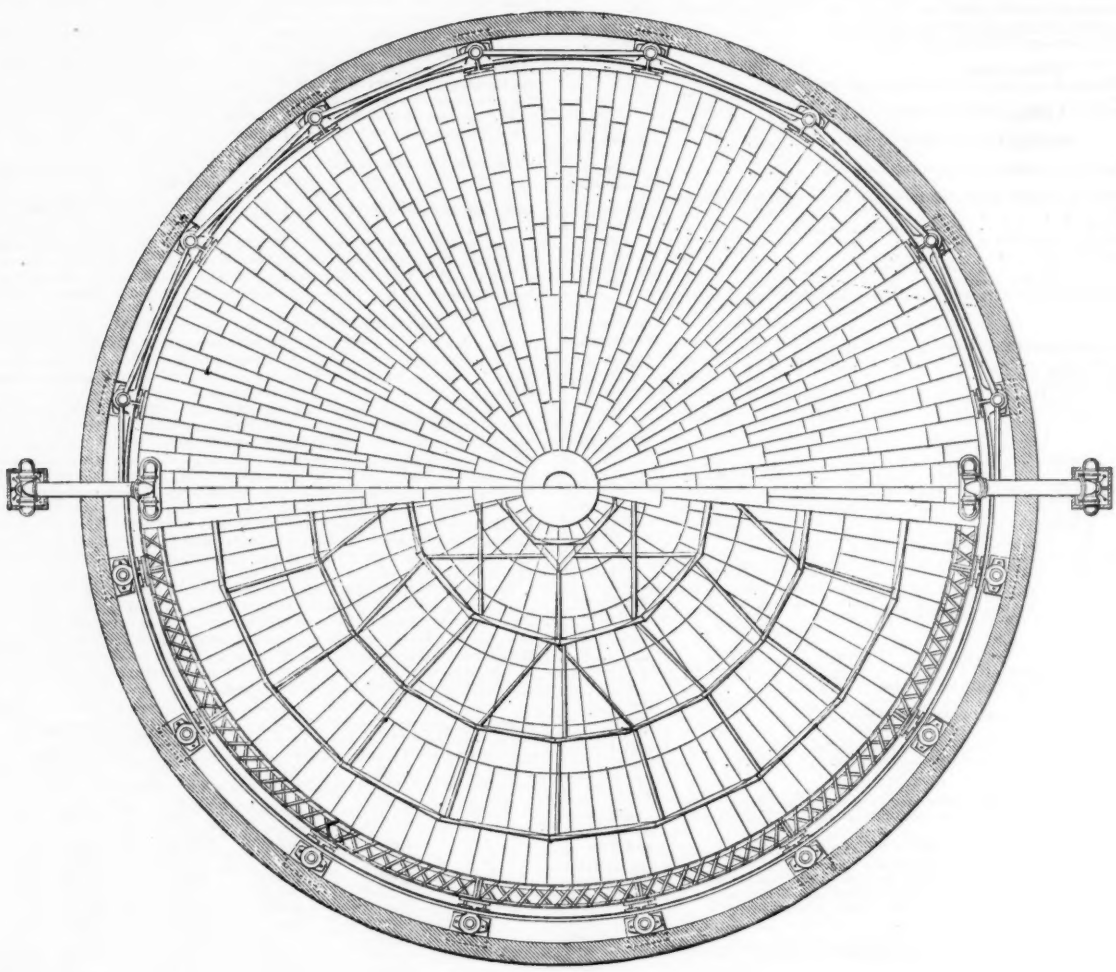


FIG. 2.

The first row rivetted on to the annular crown of the bottom of the tank was strengthened from the inside by means of an angle-iron of $\frac{80-80}{12}$, between the under part of which and the bottom surface of the tank a space of 10 mm. (0·39 in.) was left to allow this first horizontal joint to be cemented from the inside. The second row and the 18 following ones were bolted (not rivetted) by means of bolts, 20 mm. (0·78 in.) in diameter.

Each joint was formed by means of a copper wire of 6 mm. (0·23 in.) diameter, and finished, to ensure tightness, with cast iron cement, rammed both inside and outside.

Each row was divided into 16 segments of about 7 m. (22·96 ft.) long,* their ends being joined both inside and outside by means of rivetted iron butt straps, so that on the whole height of the ⌊⌋ iron rows—*i.e.*, up to the height of 6 m. (19·68 ft.), no other rivets project inside the tank but those of the butt straps which unite the segments.

The holes for the bolts of the horizontal joints of the ⌊⌋ irons are punched in sets of five, so that the section may not be weakened by their being all in the same vertical plane.

All the horizontal joints which were bolted were perfectly water-tight, and it was not found necessary to retouch any of them after the tank had been filled.

No ⌊⌋ irons being manufactured light enough to enable the upper part of the tank to be built cheaply, recourse was had, for its completion, to three rows of sheet-iron of 8 and 6 mm. (0·31 in. and 0·23 in.) thickness respectively.

Lastly, an upper row or brim of cast-iron plates, bolted and caulked, completes the tank, as a thin plate of sheet iron would oxidize when exposed to the action of ammoniacal water, and to the contact of the air.

The junction between the top ⌊⌋ iron and the bottom sheet-iron row, as well as that of the upper sheet-iron row and the cast-iron brim, is

* The number of the columns, and, consequently, of the guides, being fixed at 16, each row is divided into 16 segments, or

$$\frac{35{\cdot}80 \times 3{\cdot}14}{16} = 7{\cdot}025 \text{ m. } (23{\cdot}04 \text{ ft.})$$

FIG. 4.

FIG. 5.

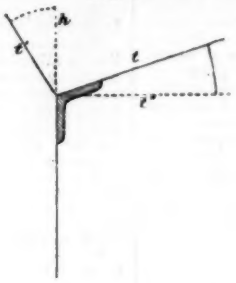
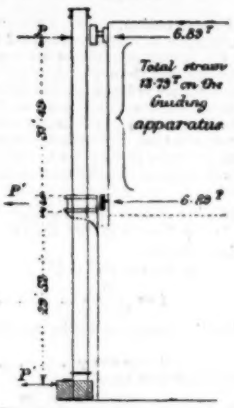


FIG. 6.



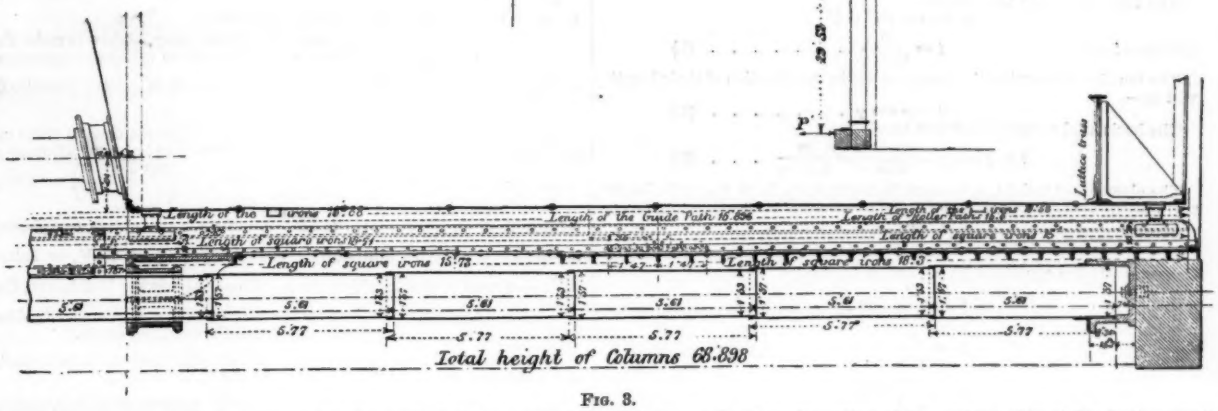


FIG. 3.

effected by means of angle-irons, rivetted to the vertical plates, and bolted to the ⌊ irons and to the brim.

Instead of using the ordinary commercial ⌊ irons, irons of a special design can be used, enabling the joint to be made without copper wire; it is merely a question of grooving the rollers by which the irons are rolled.

The ⌊ irons do not increase the weight of the cylindrical side of the tank, as for every mètre in height, whether the tank be made of ⌊ irons or of sheet iron bound with ⌊ hoops, if the total surface exposed to tension be the same (as it is in the present case, since we have assumed the same tensile stress), then the weight will be identical.

Irons specially made offer the following advantages:—

1. They save three-quarters of the rivets for the vertical joints, inasmuch as they can be three times longer than the sheets on the outer circumference.
2. They save the rivets of the hoops, as these must generally pass through the sheets.
3. They save the rivets of the horizontal joints, as they also pass through the vertical sheets.
4. All the bolts uniting the horizontal joints of the ⌊ irons are outside, and can consequently be replaced, in case of accident, without its being necessary to empty the tank. This cannot be done if rivetted sheet iron is used.
5. Lastly, they lessen the danger of leakage through the rivetted joints, of which there are almost none, the ⌊ irons enabling the tank to be built with only 16 vertical joints, which are at the junction of these irons on the whole circumference.

At Verviers it only took three hours to place the bottom of the tank in its proper position, and this operation was carried out without the least difficulty. The bottom sheets were put together and rivetted on blocks of timber piled up to a height of 0·700 m. (2·29 ft.) above the concrete bed on which the tank was to be laid. The first row of plates was rivetted to the bottom of the tank, and the two immediately above it were bolted, thus forming a shallow tank 35·800 m. (117·45 ft.) in diameter and 0·900 m. (2·95 ft.) high.

A central tube and 44 other tubes were arranged in two concentric circles, so as to enable 45 screws to be screwed into cross pieces attached to the upper collar of each tube.

The base of the screw rested on a cast-iron bed-plate of smaller diameter than the tube, and its head formed a socket in which was inserted a cross-piece to work the screw.

The outside row of plates at right angles to the cylindrical sides was also supported on blocks of timber.

As soon as the bottom of the tank was completed, rivetted, and caulked, the blocks were knocked away, and the tank was lowered by working all the screws simultaneously, besides a number of screw-jacks placed at the outer periphery.

The tubes were then obturated by means of small iron plates, rivetted and caulked, the screws and their bed-plates having been previously removed.

This method of constructing a tank, carried out in 1874 at the gas-works of Gérard-Champs, at Verviers, where it gave the most satisfactory results, has been since adopted with the same amount of success by the Compagnie Générale pour l'Eclairage et le Chauffage par le Gaz, at their works at Charleroi, Anderlecht, Châtelet, and Valenciennes.

It was further declared admissible in the form of tender issued by the city of Brussels for the erection of the gasholders which were built in 1875 and 1876.

Figs. 1 and 2 show the elevation and plan of the gasholder, the principal dimensions of which are, as already stated—

Tank	diameter	=	35·80 m. (117·45 ft.)
	height	=	10·10 m. (32·84 ft.)
Bell	diameter	=	35·00 m. (114·83 ft.)
	height	=	10·00 m. (32·80 ft.)

The bell is guided by 16 column guides, the gas being admitted and discharged by means of articulated pipes 0·50 m. (1·64 ft.) in diameter [Pauwel's system], such as have been in use for over 30 years by the Paris Gas Company. They are formed of straight pipes of sheet iron, comparatively light, connected by joints in cast iron. Each joint consists of a pipe at right angles to the main pipe, with its extremities turning in stuffing-boxes. The stuffing of these joints offers no difficulty during the play of the gasholder, and requires but ordinary care. Yarn soaked in melted suet suffices to ensure the tightness of the joint during the action of the bell.

Figs. 3 and 4 show the section of the vertical side of the tank, as well as the horizontal section of the guides above the tank.

We will now say a few words on the construction of the bell, and the various pressures it should be able to withstand.

Vertical Side of the Tank.

This is formed of—

One upper row of plates	. . . .	5½ mm.	(0·21 in.) thick.
One lower row of plates	. . . .	5 ,,	(0·19 in.) ,,
Eight intermediate rows of plates		4½ ,,	(0·17 in.) ,,

Let us suppose a maximum manometrical pressure of 20 c. (7·87 in.) of water, or 200 kilos. per square mètre (41 lbs. per square foot), or of $\frac{200 \text{ k.}}{1{,}000{,}000 \text{ mm.}} = 0{\cdot}0002$ k. (0·00044 lbs.), taking the millimètre as unity, and the minimum thickness as 4½ mm. (0·17 in.)

$$\text{Tension} = \frac{pd}{e} = \frac{0{\cdot}0002 \text{ k.} \times 35{,}000 \text{ mm.}}{2 \times 4{\cdot}5} = 0{\cdot}777 \text{ k. (1·71 lb.).}$$

The resisting power of the rivetted joints being only 56-100ths of that of the sheet when whole, we find that $\frac{0{\cdot}077}{0{\cdot}56} = 1{\cdot}387$ k. per square millimètre of section (1960 lbs. per square inch), or 1-26th of the breaking strain.

The crown is made of three zones of plates of 5½, 4½, and 5½ mm. thick (0·21 in., 0·17 in., and 0·21 in.) respectively, commencing from the centre of the circle.

We assume the same manometrical pressure of 20 c. (7·87 in.) of water, and a minimum thickness of plates or sheets of 4½ mm. (0·17 in.).

The spherical crown, considered as forming part of a complete hollow sphere, is exposed to tensile strains tangential to the whole circles of the sphere, and equal around each point.

The tensile stress is expressed by $t = \frac{pr}{2e}$. This formula shows that if it were proposed to make the tensile stress per unity (per square millimètre [0·00155 in.], for instance), the same as that which exists according to the generating lines of the shell, it would be necessary to make the radius, r, of the crown equal to the diameter, d, of the first formula.

In fact, were we to continue taking the millimètre (0·00155 in.) as unity, we should find the same tensile stress on the crown as on the shell, with an identical thickness of metal.

$$t = \frac{pr}{2e} = \frac{0{\cdot}0002 \text{ k.} \times 35{,}000 \text{ mm.}}{2 \times 4{\cdot}5} = 0{\cdot}777$$

and $\frac{0{\cdot}777 \text{ k.}}{0{\cdot}56} = 1{\cdot}387$ k. per square millimètre section (1960 lbs. per square inch).

But the pitch of the crown 4·700 m. (15·42 ft.) would be too great, and would constitute too great a dead space with regard to the working capacity of the holder.

The volume of this dead space is, therefore, considerably reduced by making the radius of the crown 70 m. (229·66 ft.), which gives a pitch of 2·223 m. (7·29 ft.) without in any way diminishing the resisting power.

Having doubled the radius of the spherical crown without altering the thickness of the sheets (4½ mm. [0·17 in.]) we have doubled the tensile stress—that is, the resisting power of the crown will be only half that of the cylindrical shell.

$$t = \frac{0{\cdot}002 \text{ k.} \times 70{,}000 \text{ mm.}}{2 \times 4} = 1{\cdot}555 \text{ k.}$$

and, taking into account the weakening of the sheets through rivetting $\frac{1{\cdot}555 \text{ k.}}{0{\cdot}56} = 2{\cdot}777$ k. per square millimètre (1¾ tons per square inch), or 1-13th of the breaking strain.

It follows, therefore, that as the radius increases when the pitch diminishes, we must, if we wish to retain the same power of resistance, add to the thickness of the sheets, thereby causing an increase of the weight to be lifted, of the pressure on the outlet-pipe, and of the cost.

Assuming a radius of 140 m. (459·32 ft.), which gives a pitch of about 1 m. (3·28 ft.), the sheets being still 4½ mm. (0·17 in.) thick,

$$\text{the tensile stress} = \frac{0{\cdot}0002 \text{ k.} \times 14{,}000 \text{ mm.}}{2 \times 4{\cdot}5} = 3{\cdot}11 \text{ k.}$$

and $\frac{3{\cdot}11 \text{ k.}}{0{\cdot}56} = 5{\cdot}555$ k. (about 3½ tons per square inch) utmost limit of stress adopted in this mode of construction.

It follows, therefore, that, in adopting a pitch of 2·223 m. (7·29 ft.) on a radius of 70 m. (229·66 ft.), better conditions as regards power of resistance, safety, and cost are secured than would be with a smaller pitch.

The dead space in such a case is but a matter of secondary importance, since when once full it remains so, and need only be refilled with gas when repairs necessitate the total or partial emptying of the holder.

It may be as well to remark that, in the foregoing calculations, we have assumed a manometrical pressure of 20 c. on the minimum thicknesses of metal, whereas the actual manometrical pressure would be really but 13 to 14 c.

Calculations of the Resisting Power of the Angle-Iron joining the Side Sheets to the Crown of the Bell (Fig. 5).

The tension t on the iron sheets—

$$p = t \cos (90° - \gamma)$$

and therefore—

$$t = \frac{p}{\text{sine } \gamma} \quad \ldots\ldots\ldots \quad (1.)$$

The tensile stress or traction on the rivets in the direction of their length will be—

$$t' = p \cos \gamma \quad \ldots\ldots\ldots \quad (2.)$$

The horizontal component t'' will be—

$$t = t \cos \gamma = \frac{p \cos \gamma}{\text{sine } \gamma} = \frac{p}{\text{tang } \gamma} \quad \ldots \quad (3.)$$

The elementary weight, p, is equal to the weight, P, of the cylinder or shell, distributed over the circumference of which D is the diameter, *i. e.*—

$$p = \frac{P}{\pi D}$$

Consequently the equations (1), (2), and (3) become—

$$t = \frac{P}{\pi D} \text{ sine } \gamma$$

$$t' = \frac{P}{\pi D} \cos \gamma$$

$$t'' = \frac{P}{\pi D} \text{ tang } \gamma$$

If we use these formulæ, we find the angle $\gamma = 14°$; sine $\gamma = 0{\cdot}24192$

$$\frac{1}{\text{sine } \gamma} = \frac{1}{0{\cdot}24192} = 4{\cdot}13$$

P = about 62,400 k. (about 61½ tons), including the circular column, the lower angle-iron, and the rollers—

$$t = 4{\cdot}13 \times \frac{62{,}400 \text{ k.}}{3{\cdot}14 \times 35} = 2345 \text{ k. } (2{\cdot}31 \text{ T.})$$

There are two alternate rows of 17 rivets per mètre (3·28 ft.) run. These rivets have a diameter of 12 mm. (0·47 in.).

Assuming that the holes have a maximum diameter of 13 mm. (0·51 in.), of a sheet of 1000 mm. surface, there will remain, after deducting (17 × 13), a surface = 779 mm. (2·55 ft.).

Thus, with a thickness of 5½ mm. (0·21 in.) the sectional area will be 779 × 5·5 = 4284 square millimètres (6·68 in. square), and consequently a pressure of $\frac{2345}{4284 \text{ mm.}^2} = 0{\cdot}827$ kilos. per square millimètre (1169 lbs. per square inch), or about 1-43rd of the breaking strain by tension.

Shearing of the Rivets.—There are 34 rivets, of 12 mm. (0·47 in.) diameter, in two rows, to every yard run of angle-iron.

Or 34 × 113 mm.² = 3842 square millimètres (5·95 in. square).

Cos $\gamma = 0{\cdot}97$.

The shearing stress of the rivets becomes—

$$t = \frac{P}{\pi D} \cos \gamma \; \frac{62{,}400 \text{ k.}}{3{\cdot}14 \times 35 \text{ m.}} \times 0{\cdot}97 = 550 \text{ k. } (1213 \text{ lbs.})$$

Or $\frac{550 \text{ k.}}{3842 \text{ mm.}^2} = 0{\cdot}143$ kilos. per square millimètre (202 lbs. per square inch).

If the shearing of the rivets is produced by 8-10ths of the stress capable of breaking them by tension, and we estimate this stress at 36 kilos. per square millimètre (5089 lbs. per square inch),

then $\frac{36 \times 0{\cdot}8}{0{\cdot}148} = 1$-200th of the breaking stress.

Resistance of the Angle-Iron to Crushing.—The horizontal component exerts a pressure spread over the entire section of a vertical plane through the axis of the holder.

This pressure on a radius of the crown perpendicular to the vertical plane, forming the section liable to be crushed,

$$= t'' D = \frac{P D}{\pi D \text{ tang } \gamma} = \frac{P}{\pi \text{ tang } \gamma}$$

The pressure on the other half of the diameter would be the same, but would be felt in a contrary direction.

$$t = \frac{P}{\pi \text{ tang } \gamma} = \frac{62{,}400}{314 \times 0{\cdot}24933} = 79{,}711 \text{ k. } (78{\cdot}53 \text{ T.})$$

The sheet iron has a section of 17·500 m. × 0·0045 m. = 78,750 mm.

And the angle iron a section of $\frac{125 - 125}{15}$ . . . . . = 3,525 „

Total section. . . . . 82,275 mm.

or 127·52 in. square,

making a pressure of $\frac{79{,}711 \text{ k.}}{82{,}275 \text{ mm.}^2} = 0{\cdot}968$ kilos. per square millimètre (1368 lbs. per square inch), which would not be anything like strong enough to produce even deformation.

Guiding Apparatus, Resistance to Overturning, Actual Resistance of the Columns.

The guiding apparatus, composed of 16 iron columns with rectangular paths in which the rollers work, must ensure resistance in each of its parts, and in its entirety, to the lateral strain of the pressure of the wind exerted on the bell and distributed over a certain number of columns, and this even under the most adverse circumstances—*i.e.*, when the bell is raised to its maximum height.

The bell would then expose on a vertical plane a surface of 35·000 m. × 10·000 m. = 350 sq. m. (3767 sq. ft.).

A hurricane, blowing with a velocity of 24 m. (78·74 ft.) per second, would exert a pressure of 78 to 80 kilos. to the square mètre (16 to 16½ lbs. per square foot) on a plane surface perpendicular to the direction of the wind.

According to experiments made, the pressure on a cylindrical surface would be but 5-100ths of that on a plane.

We must, therefore, reckon on a total pressure of 40 k. × 350 m. = 14,000 k. (13·79 T.), tending horizontally to overturn the guiding apparatus.

The base of each column is fixed by means of two holding bolts of 35 mm. (1·37 in.) diameter, to a base-stone 1·300 m. × 1·000 × 0·600 (4·26 × 3·28 × 1·97 ft.), weighing about 1500 kilos. (1·47 T.). The actual weight of each column, with its guiding apparatus, is about 3000 kilos. (2·95 T.). At a height of 9 m. (29·52 ft.) these columns are clasped and wedged, by means of cast-iron coupling brackets, to the upper row of plates of the tanks, and at the top they are bound by iron collars to a framing of I-irons, the whole forming a 16-sided polygon.

When the bell is raised to its maximum height, the top rollers throw on to the guiding apparatus only half of the lateral pressure exerted by the wind at a height of 9·600 m. (31·49 ft.) above the cast-iron brackets—*i.e.*, $\frac{14{,}000}{2} = 7000$ k. (6·88 T.), the remaining half of the pressure being thrown by the lower rollers on to the guides in the tank.

If we only rely on half the number of columns—say, eight—to resist the tendency to turn over, each column must be able to withstand a pressure of $\frac{7000 \text{ k.}}{8} = 875$ k. (1929 lbs.) over a length of 9·60 m. (31·49 ft.) = 84,000, taking the centimètre as unity.

At the level of the brackets the diameter of the columns is 0·480 m. (1·57 ft.), and the thickness of the plates 6 mm. (0·23 in.), equivalent to a momentum of inertia of $\pi \frac{(\gamma^3 - \gamma'^3)}{4} = 3{\cdot}14 \times \left(\frac{24^3 - 23{\cdot}4^3}{4}\right) = 794$ k. (1751 lbs.), or a resisting force of $\frac{840{,}000}{794} = 1058$ k. per square centimètre, or 10·58 k. per square millimètre (14,958 lbs. per square inch), or better $\frac{36}{10{\cdot}58} = 1{\cdot}34$th of the breaking strain. If we rely on the 16 columns, the proportion of the power of resistance becomes 5·29 k. per square millimètre (7479 lbs. per square inch), or about 1-7th of the breaking strain.

Stability.—In order to ensure equilibrium in the horizontal movement, the horizontal reactions P′ must be equal (fig. 6).

$Pa = P'a'$, therefore $P' = \frac{Pa}{a'} = \frac{875 \text{ k.} \times 960}{900} = 933$ k. (2057 lbs.), always assuming that we rely on only eight columns for the resisting momentum.

The resistance to shearing of the two holding bolts of 35 mm. (1·37 in.) is $\frac{933 \text{ k.}}{2 \times 962 \text{ mm.}^2} = 0{\cdot}485$ k. per square millimètre (685 lbs. per square inch), in order to counteract the pressure P′ which tends to make the base of the column slip.

These two bolts might with perfect safety withstand a stress of 2 × 962 mm. × 10 k. = 19,240 k. (18·88 T.), or, assuming the whole stress to be borne by one column, $\frac{7000 \text{ k.} \times 960}{900} = \frac{7460 \text{ k.}}{2 \times 962} = 3{\cdot}877$ k. per square millimètre (5481 lbs. per square inch).

The column being fixed to the base-stone, the stone would offer to any lateral sliding movement induced by the pressure P′ a resistance = 993 kilos. (about 1 ton).

Actual weight of the column	3000 k.
Actual weight of the stone.	1500
Total	4500 k. (4·433 T.)

The friction of stone on stone being estimated at a minimum of 0·4, we find the resistance to lateral displacement will be 4500 k. × 0·4 = 1800 k. (about 1¾ tons), or almost the double of P′.

We still base our calculations upon an hypothesis of only eight columns; we may add that the base-stone is keyed into the side of the foundation hole, and that it can be fixed laterally over its entire thickness.

The result of the foregoing is that the momentum of the tank to fall over is thrown on to the cast-iron brackets at the top of the tank.

Let us still keep only eight columns as our data for the momentum of resistance, or P′ = 933 kilos. (2058 lbs.).

Each half bracket is held by six bolts, of 25 mm. (0·98 in.)—*i.e.*, 6 × 490 = 2940 mm.² (4·58 sq. ft.), which, at 10 kilos. each, offers a resistance of 29,400 kilos. (about 29 T.) for a normal strain following the radius of the tank, of 933 kilos. (2058 lbs.). The total pressure thrown on to one column would be 7460 kilos. (7·35 T.), or four times less than the resisting power of the bolts.

The cast-iron bracket has a plate, 1·000 m. (3·28 ft.) high, and 0·018 m. (0·70 in.) thick, united to the adjoining plates by two vertical rows, each containing eight bolts of 20 mm. (0·78 in.), and to the sheet-iron side immediately below it by one horizontal row of bolts of 20 mm. (0·78 in.).

This upper circumference, besides resisting the momentum tending to overturn the tank, has to bear the tension due to the hydrostatic pressure inside the tank, which amounts to 35·80 × 1·00 × $\left(\frac{1000 \text{ k.} \times 500 \text{ k.}}{2}\right)$ = 26,850 k. (about 26½ tons) on two diametrically opposed sections, or 13,425 k. (13¼ tons) on one section.

Adding the two pressures together	1. For the total pressure of the upper rollers on one bracket.	7,460 k.
	2. For the total pressure of the lower rollers on the guides in the tank. .	7,000
	3. Hydrostatic pressure on one section .	13,425
Total pressure tending to overturn tank . . .		27,885 k. (about 27½ tons.)

Momenta of resistance—

a. Bolts $\frac{27{,}885 \text{ k.}}{2 \times 8 \times 314 \text{ mm.}^2} = 5{\cdot}555$ k. per square millimètre (3½ tons per inch) of section with the total strain on one column, or 1-6th of the breaking strain.

b. Section of the plate $\frac{27{,}885 \text{ k.}}{1000 \text{ mm.} \times 18 \text{ mm.}} = 1{\cdot}549$ k. per square millimetre (2188 lbs. per inch) of section with the total strain on one column, or 1-8th of the breaking strain.

If we consider that the total strain will be borne by eight columns instead of by this one only, then the strain on the bolts would be

$$\frac{\left(\frac{7460 + 7000}{8}\right) + 13{,}425}{3024 \text{ mm.}^2} = 3 \text{ kilos. per square millimètre (4241 lbs. per}$$

inch), or 1-12th of the breaking strain, and on the cast-iron plate $\frac{15,232}{1000 \text{ mm.}^2} = 0{\cdot}846$ kilos. per square millimètre (1196 lbs. per inch), or about 1-14th of the breaking strain.

SOCIETY OF ARTS TECHNOLOGICAL EXAMINATIONS, 1878.

The results of the Society of Arts Technological Examinations for the present year have just been published, and in the "Gas Manufacture Section" we notice the following have obtained certificates:—

Askew, Benjamin, Wedgwood Institute, Burslem.
Blair, Thomas, Birkbeck Institute, with the prize of £5.
Dempster, John, Mechanics Hall, Elland, near Halifax.
Fligg, Mark, Dewsbury Mechanics Institute.
Glover, Samuel, Mission Hall, St. Helen's.
Hobart, John W., Batley Mental Improvement Society.
Holgate, Thomas, Burnley Mechanics Institute.
Plant, Joseph, Wolverton Science School.
Sheard, John T., Batley Mental Improvement Society.

The following candidates have passed in their Technological subjects, but not having gained the required successes in the examinations of the Science and Art Department, have not obtained certificates:—

Akroyd, Benjamin, Elland, near Halifax.
Haddock, William S., Widnes.
Hepworth, R. A., Elland, near Halifax.

It should be mentioned, however, that Mr. Hepworth has previously obtained the prize in both the elementary and advanced stage, and was this year trying for the honor's certificate; and that Mr. Akroyd has previously obtained the elementary prize, and was this year trying for the advanced stage.

RIO DE JANEIRO GAS SUPPLY.

From a copy of the *Anglo-Brazilian Times* of the 8th ult., which we have received, it appears that the Ministry of Agriculture and the Rio de Janeiro Gas Company, Limited, having failed to come to agreement upon a renewal of the gas supply service, the contract for which will expire in March next, the Directory of Public Works have advertised for tenders, to be sent in by the 1st of December, for the lighting of Rio during a term of 33 years.

The mode of tender is as follows:—

1. The closed tender must be presented by 3 p.m. of the 1st of December next, in Rio to the Directory of Public Works of the Ministry of Agriculture, and in London, Paris, and Washington to the Brazilian Legations there.

2. The proponents must present, outside of the envelopes of their tenders, documents establishing their ability to carry out the service they propose to undertake.

3. No one may compete unless he has previously lodged in the National Treasury, in the Treasury Delegacy in London, or in any of the above-named Legations, in money or bonds of the public debt of the empire, a caution of 50,000 dols., or the corresponding amount in foreign money of £5000, 125,000 frs., or 25,000 dols. in gold.

4. The competition will turn merely on the price per cubic mètre of the gas to be supplied, and on the term of the privilege, which in no case can exceed 33 years. All the other clauses of the contract, excepting whatever may be transitory, shall be, without discrepancy or modification, those proposed by the Government in the Specifications and General Conditions, which can be had at the Directory of Public Works, and at the Legations.

5. All the tenders will be opened in Rio, in public session of the Directory of Public Works, upon Jan. 2, 1879, and the Government will declare on them within 15 days afterwards.

6. On choice of a tender being made, the contract shall be considered concluded, and the preferred proponent shall have merely to sign the general conditions, which will be entered in the proper book of the Secretariat of Agriculture. For greater facility, each of the proponents resident out of Rio must, with the necessary antecedence, constitute in Rio an Attorney duly empowered to sign the general conditions, in case the preference is given to him.

7. Should the proponent refuse to sign those conditions, after being notified of the acceptance of his tender, he will forfeit the caution to the Treasury.

8. The Government reserves the right to annul the competition within the period fixed by clause 5 for decision upon the tenders sent in.

The notice from which the above terms are copied is dated July 22, 1878, and is signed M. Buarque de Macedo, Chief of the Directory.

The following are the chief general conditions referred to:—

I. The Government concedes exclusive privilege of the establishment and laying of gas-mains in the squares and streets of the city of Rio de Janeiro, within the bounds of the Decima Urbana. This privilege shall not forbid the use, by public establishments, other enterprises, or private persons, of any other kind of illumination not requiring pipes to be laid in the public squares and streets. And the Government may authorize the laying of any pipes required to experiment with any other system of lighting not yet introduced.

II. The Contractor, if not the Rio de Janeiro Gas Company, Limited, shall have to acquire the plant of this Company at the price fixed by the Government valuators under clause 30 of the contract of March 11, 1851. This price will be communicated in the Secretariat of Agriculture and the Brazilian Legations in London, Paris, and Washington, to proponents requiring it, up to the 31st of October next.

XVIII. The public lighting shall include the public streets, squares, passages, gardens, quays, piers, and buildings of any kind, including municipal ones and establishments of literary instruction and of arts and trades. No remuneration will be payable to the Company for the illumination of the squares, streets, gardens, quays, and piers situated within the perimeter of the present gas lighting of the city and suburbs, this service being considered remunerated by the price of private lighting and as compensation for the privilege conceded to the Contractor by the first clause of this contract. The outer illumination of the public buildings on national holidays shall also be effected gratuitously. The provisions of this clause shall be without effect should the Government prefer to pay for the public lighting of the present illuminated area of the city, as provided for in the Transitory provision.

XIX. In the part not included in the area of the present lighting, the Government shall pay an hour for the gas consumed in the lighting of the squares, streets, gardens, &c. Should the provisions of the preceding clause prevail, this price shall be reduced each year according as private lighting increases, and in the ratio of 1 to 3, so that, when the private consumption, added to that of the public establishments, becomes the triple of that of the lighting of the squares and streets, the latter shall be effected without cost to the Government.

XXIII. The price per cubic mètre of the gas supplied to private persons and public establishments is throughout the whole term of this contract. When, however, the undertaking pays, in two successive years, dividends of over 10 per cent., after deducting its rate of amortization, that price shall be diminished proportionately to the excess. Any other mode of gas supply shall be settled upon by the Company and the individual.

XXIV. Meters and apparatus may be supplied by any one, but the former must be set by the Company, and be of a kind approved by the Government.

XXVIII. The payment of the public or private consumption shall be made quarterly in gold, or its equivalent in paper money. So soon as the prime material used is national, the gold payment shall cease.

XXXIV. At the termination of the privilege conceded by the present contract, the Government shall receive, without burden of any kind, all the material, buildings, and other appurtenances, all in perfect state of conservation, and also the combustible and accessories in store for three months working.

XLI. This contract shall come into force on the 26th of March, 1879, on which day the lighting herein contracted for must be in operation, and shall expire on the same day of the year 1912.

TRANSITORY.—To enable the Government to decide better on the provisions of Clause XVIII. the proponent must also declare the price per cubic mètre, in the case of payment being made for the public lighting of the present lighted area of the city. Under this hypothesis the price shall in any case be less than that declared for private lighting.

In reference to the above, the Directors of the Rio de Janeiro Gas Company have issued the following report to their Shareholders upon the present state of the negotiations between the Imperial Brazilian Government and the Company:—

The Shareholders know, from previous reports of the Board and statements at general meetings, that the Company's exclusive privilege, under the concession for lighting Rio de Janeiro with gas, will expire on the 25th of March next, and that the Company has been for some time in negotiation with the Brazilian Government for the purpose of renewing it.

The Board regret to say that they have not yet been able to come to terms, the price and conditions offered by the Ministry of Agriculture and Public Works being such as would leave the Company no reasonable prospects of any profit; and they more deeply regret that the Ministry has taken steps which form a serious, and, as the Directors and the legal advisers of the Company consider, an unjustifiable attack on the Company's rights, and which it is proper should be laid before the Shareholders.

Public notices have been issued by the Ministry, asking for tenders from other persons to light the city with gas after the 25th of March next. If this had stood alone, the Board, though they would have regretted it, could not have complained of it as unjust. When the exclusive privilege expires, the Board cannot contest in other persons the same right as that which they claim for the Company, of supplying with gas any persons who may choose to take it. In such a competition the Board would have no fear for the success of the Company. But the Ministry, well knowing that no one else could be in a condition to supply gas by March next, for want of the necessary works and plant, has attempted to supplement their request for tenders by a claim to purchase the whole of the Company's property, compulsorily, at a price to be fixed by valuers appointed by the Ministry itself, at which price the Government engage to hand it over to the new contractors.

The concession gave the exclusive right to supply the city with gas for 25 years; but there was not a word in it, or in any of the subsequent documents bearing upon the question, which limited the right of the Company to carry on business as long as it pleases without any privilege. There was, however, an article in the concession which was intended to relieve the Concessionaires, in case they should think a continuance of the business without a privilege undesirable; and it is on this article that the Ministry of Public Works strives to support its claim. The article ran thus:—

"Article 30. At the end of 25 years, if the Government does not renew the contract, it will pay (*pagará*) the value of the material property of the undertaking (*do material da Empresa*) according to a valuation made by valuers exclusively named by it" (*elle*, that is, the Government).

Now, in the first place, the Board are advised that, if this article ever had the meaning which the Ministry of Public Works now attributes to it, subsequent acts of the Government have deprived it of effect; so that it cannot now be legally used against the Company. But, apart from this, the claim now made is not to be justified even by the original wording of the article.

The clause is evidently one for the protection of the Concessionaires, and its obvious meaning is that if *they* wish to sell (for there is not a word binding them to sell), the Government "will pay" for their works, &c. In such a case it might not be unreasonable that the price should be fixed by the Government valuers, for, if the Concessionaries should think it too low, they would always have the choice of refusing it.

But the way the Ministry has proceeded has been to appoint, without receiving or asking for any assent by the Company, three Government Engineers to value the Company's property; and that appointment is accompanied by detailed directions as to the mode in which the Engineers are to perform their functions, directions which evidently point to a principle of valuation altogether unwarranted by the article cited, or by the reason and justice of the case. From those directions, it appears to be the view of the Department of Public Works that the property of the Company is not to be valued as a complete and going concern (which would be the only just principle), but by separating the various parts of which it consists, and valuing each part by itself without reference to the rest; or, in other words, at breaking-up price.

It needs no argument to show that, if the Company were bound to sell, the value of its corporeal property (*valor do material da Empresa*) would be its value as it stands, a complete working establishment, ready to supply and in the act of supplying gas to the city of Rio de Janeiro; not as it would be if it were pulled to pieces and made useless. Nor has its cost anything to do with its value. If gas-works could, owing to some fall in prices, be erected for half the cost of those belonging to the Company, the Government would think cost very much beside the question; and if the skill and enterprise of the Company have given the works a value beyond their precise cost, it would on any sale clearly be entitled to the benefit of the value thus acquired. Impartial arbitrators, even if appointed by the Government, would, without doubt, recognize these principles; but the present valuers are not allowed to act on their own judgment, and are fettered by instructions to which the concession gives no sanction, and which will deprive the conclusions of the valuers of all legal and moral value.

The Directors still entertain hopes that the Department of Public Works will, upon further consideration, adopt more reasonable views in regard to the Company, and offer terms which may be acceptable. Should these hopes, however, be disappointed, the Directors will then call together their fellow-Shareholders, and ask for an expression of their confidence, and, if need be, an approval of such arrangements as the Board may consider necessary for the conduct of the Company's affairs, after the expiration of the present privilege.

In the meantime, the Directors will firmly and earnestly defend the rights of the Shareholders, and are confident that the appeal which the

Company have already addressed to His Imperial Majesty in Council will not have been made in vain, but that the well-known sentiments of honour and justice which actuate His Imperial Majesty and his Government will induce them to meet that appeal in a manner satisfactory to the rights of the Company.

By order,

THOMAS DAWSON, Secretary.

Offices of the Company, 1, Gresham House, Old Broad Street, London, E.C., Sept. 3, 1878.

LIVERPOOL WATER SUPPLY.

THE VERNIEW SCHEME POSTPONED.

The Monthly Meeting of the Liverpool Town Council was held last Wednesday—Alderman WOODRUFF in the chair.

Mr. WILSON, in moving the general proceedings of the Water Committee, said he regretted to announce that they would be unable to carry forward the new scheme. There had been no exertions lost, but the time was so short that it would involve a very considerable amount of expense, and the plans not being so perfect as they wished them to be, the Committee reluctantly decided to postpone the scheme until the next session but one. At the same time, the Town Clerk had pointed out to the Committee that, if it met with acceptance, a great deal might be done to push forward the scheme by provisional agreements, so that the whole of the two years need not be lost. He felt much regret in making this announcement, as the Council were aware that in the event of a series of dry seasons they were in a position to meet the wants of Liverpool for four years only, and under the most favourable circumstances for seven years more. By that time the population would be increased by 100,000, and a very serious responsibility would be incurred in the matter if a scheme was not obtained in time.

MANCHESTER CORPORATION WATER SUPPLY.

The Monthly Meeting of the Manchester City Council was held last Wednesday—the MAYOR in the chair.

Alderman LAMB, in moving the adoption of the minutes of the Water-Works Committee, said he thought it was desirable to say a few words on the subject of the Thirlmere water scheme, respecting which the ratepayers would shortly be called upon to vote. And as there was a resolution on the minutes that the Sub-Committee should give the public the fullest information possible upon the Thirlmere scheme and the water-works in general, he was in order. There had been so many misstatements set forth as facts, that the ratepayers did not know where they were—who was right, or who was wrong. There were two members of the Council, not members of the Water-Works Committee, who knew nothing of the internal management of the water-works, yet who were misleading the public and traducing the Water-Works Committee and Mr. Bateman, their Engineer. It was, therefore, high time that further information should be given to the public. The Council had been charged with not giving information, and the inference was that they had some secret end to serve, and that they were impelled by motives which they were ashamed to let the public know. What motive, he asked, could they have in view, and what end had they to serve but honestly to secure a constant supply of water for the wants of the population of which Manchester was the centre? According to what was said by the opponents of the scheme, there was water enough for the city; they should let the outlying districts go without, and leave the next generation to provide for itself. If the Committee had acted in that spirit, where, he asked, would Manchester now have been? At Glasgow, as he was told by a member of its Corporation, they were consuming above 30 gallons of water per head per day. Were the same quantity required in Manchester, the whole of the present resources would not give it, even without any for trade purposes. Alderman King had said that, as the yearly increase was 400,000 gallons per day, they would need no increased supply for 30 years. What were the facts? In 1873 the consumption was 15,471,588 gallons, or an increase of 1,087,952 as compared with the previous year. In 1874 the consumption was 16,713,957 gallons, and in 1875 it had gone up to 17,133,434 gallons. The apparent reduction in the increase was consequent on superior fittings and inspection. In 1876, after taking off the public rate, the extra income over the previous year made the consumption 17,764,163 gallons, or an increase of 630,720; and in 1877, 18,598,708, being an increase of 834,543 over 1876. Take the consumption of 1872—namely, 14,383,636 gallons—from the 18,598,708 of 1877, and there was a difference of 4,215,072 gallons. Dividing the latter by five, there was 843,014 left, which, being multiplied by eleven, amounted to 9,273,154. This amount added to the consumption for 1877, brought up a total of 27,871,862. This showed where they would be before the new works were completed. The extra revenues of the last and present years proved an increased consumption of 1,000,000 gallons daily, at 6d. per 1000 gallons. At the best it was, however, unwise to trust to average calculations where the margin of supply was so small, and the article one for which there was no substitute. In conclusion, he said the ratepayers ought to be told that the only two members of the Council who opposed the Thirlmere scheme were not, and never had been, members of the Water-Works Committee, except *ex officio* as Mayors. The unsoundness of their arguments and the incorrectness of their figures had been proved again and again. If, however, in spite of all that had been said, and in opposition to the unanimous opinion of their representatives, the ratepayers of Manchester preferred to be guided by two gentlemen who had had no experience in the matter, they removed the responsibility from both the Water-Works Committee and the Council, and took it upon their own shoulders.

Alderman CURTIS contended that he was justified in saying that no reliance could be placed upon Mr. Bateman's figures after his erroneous statements with regard to the capabilities of Longdendale. From 1860 to 1868 that gentleman urged the necessity of increasing the supply for Manchester, and in the latter year he said that there was not a moment to lose; that, if the consumption went on at its present rate, in 1877 the whole of their 27,000,000 gallons per day would be consumed. He would ask the Committee whether, though they were so urged on, they really believed Mr. Bateman? If they did, why should they have waited from 1868 to 1877 without making any move? The true policy of the Committee would have been to have got the neighbouring towns to take some of the risk and responsibility. They were, however, too proud to have any one joining them; they preferred to take all the risk themselves, and let others have the benefit.

Alderman GRAVE (Chairman of the Water-Works Committee) said he would put the case of the Gas Committee, and ask if that Committee would tolerate any claim by the out-townships to share in the cost of extending the street-mains, in order that they might participate in the profits of the gas supply? The citizens should understand that they would get from Thirlmere for 12s. as much water as it cost them £1 to bring from Longdendale. Their present works, when completed, would yield 25,000,000 gallons per day, having cost them £3,000,000; but for that sum of money, or less, they would get from Thirlmere 50,000,000 gallons, laid down at their own doors. A good deal had been said as to the extra cost which would be entailed upon the Council. Mr. Bateman's estimate for bringing the water to Manchester was £1,700,000, and a further sum of £500,000 would cover all extra charges. The purchase of property at Thirlmere, including the lake itself, had not cost the Committee as much as their own valuation, and Mr. Bateman, in first recommending the scheme, said: "It is so simple, and the engineering difficulties are so slight, that I recommend it heartily for your approval." At the same time he offered to take off 1 per cent. of his own commission. The people of Manchester should know that so simple would the works be that they could let almost every yard by contract. But the construction of the Longdendale works would have baffled the cleverest engineer. Cracks and fissures in the rocks, which neither Mr. Bateman nor any other person could have discovered, had been the cause of much extra expenditure, and yet the works were cheap. There were none in the kingdom doing so well. He asked the citizens to endorse the action of the Committee, and to sanction that which they all felt so confident could be carried out for the advantage of the city.

Alderman KING said it appeared to him that nothing could be more fallacious than to calculate the amount of water used by the amount of revenue. If the Committee wished to get to the bottom of what was the increase per annum, the way would be to take the number of additional houses that they supplied each year, take the meter measurements also, and then see what the average showed.

Alderman PATTESON complained that the opponents of the Thirlmere scheme persistently ignored the information that had been furnished respecting the circumstances which had caused the estimated cost of the old works to be exceeded. He also said that, notwithstanding the increased cost, the water was supplied at a cheaper rate than in Liverpool and other towns.

Alderman LAMB, in closing the discussion, called attention to the benefits derived from the public rate. He stated that in 1847 the number of fires that occurred in the city was 112, in 1851 the number was 132, and in 1877 it was 276. The salvage in 1847 was valued at £156,125, in 1851 at £426,108, and in 1877 at £1,670,704. The loss in each of the three years mentioned was £42,653, £52,695, and £20,568 respectively. The value of property at stake was £198,778 in 1847, £478,803 in 1851, and £1,691,272 in 1877. The annual value of property within the city in 1877 was £2,675,024, against £1,231,616 in 1851, and £1,104,057 in 1847.

The minutes were then confirmed.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The demand for all descriptions of round coal continues extremely small, and, although the winter season is now approaching, it is only in exceptional cases where any real improvement can be noted, even in the better qualities suitable for house-fire purposes. In the gas coal trade there seem now to be very few contracts to be settled, those that are yet open being chiefly where buyers are endeavouring to obtain very long forward deliveries. Common coal for steam and forge purposes is still a great drug in the market, and where sales are pushed extremely low prices have to be taken. Very heavy stocks of all classes of round coal are now held at many of the large collieries, and the majority of them continue working for about six or seven days a fortnight. List prices are without change from last month, but as these are only nominal, they are scarcely worth quoting. Best Wigan Arley, at the pit mouth, although one or two firms still adhere to 10s. per ton, can readily be bought at 9s. to 9s. 6d. per ton, and common sorts in some cases at less than 7s. up to 8s. per ton; Pemberton four-feet, at from 6s. 6d. to 7s.; and common round coal at from 5s. to 6s. per ton, according to quality. Engine classes of fuel are in fair demand, and good sorts are firm at late rates, burgy at the pit mouth being quoted at about 4s. 6d., and slack at 3s. 6d. per ton, but common sorts are offered at much lower prices.

The demand for shipping purposes has fallen off, as compared with last month, and there is a great deal of pushing for orders, with prices as low as ever.

In the iron trade there has been very little doing, and with the exception that the local makers of pig iron hold for late rates, prices are weaker, nearly all the outside brands coming into this market being offered at lower prices than would have been taken a few weeks back. The finished iron trade is still without improvement, and with the exception of warehouse orders, and a few cheap odd lots, there is very little changing hands, Lancashire bars delivered into the Manchester district being quoted at about £6 per ton.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The shipments of best gas coals improve. 31,000 chaldrons of coals, the larger proportion of which were gas, were exported from the Tyne Dock last week. Gas Companies in the Baltic are beginning to make up their stocks for the winter. The harvesting in the South of England is likewise about over. Carts are available for loading coals into the interior from the small ports on the East and Southern Coasts, and a few more sailing ships were taken up last week. The price of gas coals is unaltered—viz., 7s. best, 6s. seconds per ton. The house coal trade is likewise a trifle better, but steam coals are in very moderate demand, and prices keep low. A good medium quality of steam continues to be sold at 8s. per ton.

The freight market, as a whole, is a trifle stronger. Coasting business is not very much changed; but there has been a better trade to and from the Baltic and the Mediterranean. Rates are somewhat better; but this is not likely to be for long. The freight market will, without doubt, continue to favour the shippers during the whole of this year. A good few new steamers have been built and launched over the past two months. They are gradually coming into trade, and the supply of shipping is thus kept considerably ahead of the requirements of trade.

The chemical trade was a little worse, if anything could be worse, last week, compared with the week before, and prices were rather lower. There was an entire absence of orders from the Continent, and the demand for certain qualities of manufactured iron was just a trifle better. There was no special demand for fire-clay goods. They are sent abroad in small parcels. The lead market is quiet. The importations of timber are much below the usual business of the season of the year.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

I regret to learn that what I indicated last week as a prospective happy solution of the difficulty between Mr. Henry Aitken and the Hamilton Town Council, as Corporation Gas Commissioners, in regard to the use of that gentleman's system of enriching poor gas, is not to be realized. At a meeting of that body held last Thursday, the Gas Committee reported that a communication had been sent to Mr. Aitken on the 23rd ult., calling upon him to remove the analyzer from the gas-works under their charge, to which he had sent a reply respectfully declining to do so. In the course of his letter to the Town Clerk, Mr. Aitken says: "I beg to refer you to the terms of my agreement with your Corporation. With regard to their proposal, I have to remark that, read in the light of past experience, it amounts to this—altogether ignoring the arrangements referred to: I am to come to Hamilton, arrange terms with your Corporation, then I am to

spend £300 or £400 in plant to work my process, put this plant in working order, and get five good practical managers to inspect and report on its working. Their report will show that the process is excellent, and gives results never got by any other means, and confirmed by the highest scientific authority in gas matters in Scotland." He then goes on to note that after the process had been worked for more than a year, on the installation of a new Gas Committee, there is a proposal to enlarge the gas-works to double their size, when he finds in the local newspaper (without any previous communication with him) that the Committee propose to remove his plant, at the same time publishing an adverse report on the working of the process "by the Manager, whose experience in gas-making is of a few months duration, and who gives no data or tests, but simply expresses his opinion." Thereafter the Committee call in a Gas Engineer of experience and standing, who tells them not only to keep the analyzer, but to get another. Then afterwards, in the presence of the Committee, he (Mr. Aitken) tries to find out what grounds the Manager has for his opinion, but fails to get any. In a few days the Committee call upon him to remove his plant, and put up other apparatus suited to the enlarged works. That being the experience, he thinks there need be no room for astonishment at his declining to put himself in a position in which he may again be treated, as he thinks, most unfairly. In the course of the discussion which followed the reading of the letter, a minute of the Gas Committee, dated Dec. 1, 1875, was read. It was to the effect "that Messrs. Aiken and Young be allowed to erect a gas analyzer in the works according to their patent arrangement, the said apparatus to be at the disposal of the Town Council for 18 months, and if then approved of to be paid for; a royalty of 10 per cent. on the gain in sperm value also to be paid for." Eventually it was resolved to inform Mr. Aitken that unless the analyzer be removed by him within 14 days, the Council would do so at his expense. It was reported by the Manager that the illuminating power of the gas being made at the works was 28·9 candles, and that the cost, including wages and repairs, was 1s. 8d. per 1000 cubic feet.

At a meeting of the Glasgow Town Council, held last Thursday, the accounts of the Corporation Gas Committee for the year ending the 31st of May last were approved of, on the motion of the Convener, ex-Bailie Walls, who said it would be seen from the accounts that there was a deficiency of £6400. Last year he anticipated that the deficiency would be upwards of £9000, but it was only £6400. The deficiency was accounted for by the reduction in the price of gas, which amounted to £12,000, and then there was extra for coal about £8000, making a total on these two items of £20,000. They had, however, effected a saving in the general management of £1600 during the year; they had saved in leakage to the amount of £5000, and they had also saved, by taking a larger quantity of gas out of the coals consumed, £7000—making, altogether, £13,600—which left the deficiency just about what he had stated. With reference to the question of leakage, he might state that, when the works were taken over, it amounted to 21·4 per cent., while last year it had been reduced to 16·6 per cent., making a difference of 5 per cent. in favour of the works as now carried on. That 5 per cent. represented a real saving of something like £15,000 per annum, as compared with the time when the works were taken over by the Corporation. Then the lowest amount of gas they had produced from coal was 8535 feet from every ton of coal, whereas now they were taking 10,028 feet from every ton of coal, which gave a saving of £7000. He might just remark that the saving in leakage had arisen from the renewal of the service-pipes between the mains and the tenements. That had been done at very considerable cost, but it had effected a good saving.

At the annual meeting of the Wishaw Gas Company, held last Thursday, a dividend of 10 per cent. was declared. In connection with the proposed transfer of the Company's works to the Borough Commissioners, it may be mentioned that Messrs. George R. Hislop, Paisley, and B. M. M'Crae, Dundee, have been appointed arbiters, respectively for the Gas Company and the Commissioners. It may be remembered that some two years or so ago the first-named gentleman designed and carried out considerable alterations at the gas-works for the Company.

On the recommendation of their Works Committee, the Dundee Gas Commissioners have instructed the Manager to prepare plans and specifications, and an estimate of the cost of a new gasholder. The Convener of the Works Committee said, at the usual monthly meeting held last Wednesday, that it was absolutely necessary that the Commissioners should have a new holder completed within two years. The present was considered to be a very favourable time for entering into the contract for the same, inasmuch as, owing to the extremely low price of iron, the cost would be only about one-half what it would have been six years ago.

Many people will doubtless be much surprised at learning that in the great intellectual Metropolis of Scotland, the "Modern Athens," it has hitherto been the custom on moonlight nights, or when the moon should send forth its light, to have only a certain portion of the street-lamps burning. It was announced, however, at the usual meeting of the Town Council held last Tuesday, that it had been agreed that the whole of the lamps of the city should be lit every night, whether there was moonlight or not—certainly a very fit and proper resolution.

The water supply of Ayr has been very much affected, even to an unexpected extent, by the excessive drought of the past summer. During the months of July and August, the authorities had to curtail it, latterly to a serious extent, shutting it off for about nine hours during the night, so that a regular supply might be procurable throughout the day. At the end of August the reserve supply in the reservoir was at a very low ebb, and did not equal a day's ordinary consumption, the average depth being not over 1½ feet, while there is a depth of 20 feet when the reservoir is full. The construction of the large reservoir is being proceeded with as rapidly as possible, but it cannot be made available in the present emergency.

Substantial progress has of late been made with the heavy embankment for the compensation reservoir at Stantling Cray, in connection with the new water-works for Galashiels. The mound being formed across the valley of the Caddon, will give a reservoir capable of containing 120,000,000 gallons. The Knowsdean clear water basin is not in a satisfactory condition, there being an immense leakage in the embankment, experiments for the stoppage of which have hitherto been unsuccessful. The pipe track is all finished, and workmen have been busy for some time getting the connections made, and the house-piping and fittings ready for the introduction of the water.

At the last meeting of the Glasgow Corporation Water Commissioners, a very valuable and interesting report was submitted by Mr. Gale, the Engineer, on the new western district main, and on other works that have recently been completed, or are still in progress, for improving the supply of water in the city and suburbs.

The Burgh Commissioners of Wishaw, at their monthly meeting, held last Thursday, had under consideration the water-works extensions which they have for some time contemplated. Having approved of the plans of their Engineer, Mr. Tait, they gave instructions to the Clerk to apply to the Loan Commissioners, through the Board of Supervision, for a loan of £10,000, to carry out the water extension scheme.

During the past week the Glasgow pig iron market was exceedingly flat, and prices came down on Thursday and Friday to 47s. 6d. cash, and 47s. 9d. to 47s. 8½d. one month. The extremest depression exists, and every one hurries to sell, while buyers steadily hold off.

There is no improvement to report in the coal trade, either as to demand or prices. Coalmasters have to press sales in order to keep their pits going, as orders for all descriptions are very difficult to secure.

Ystrad Gas and Water Company.—The half-yearly meeting of this Company was held at Pontypridd on Thursday, Aug. 29.—Mr. G. Fisher in the chair. The Secretary (Mr. Frank James) read the report of the past six months proceedings, and a statement of the accounts. The Chairman said the Shareholders would see that the Directors had done their work well. The authorized capital of the Company had, however, been expended, and it was their intention to have additional filters, and to make an extension of both the gas and water works, for which it would be necessary to get additional capital. The Directors would, therefore, with the free sanction of the Shareholders, go to Parliament next session to raise the necessary money. It would be as well for him to remind them that they should not anticipate a dividend of 10 per cent. on the new capital, as the dividend would probably be restricted to 6 per cent. The report was adopted, a dividend of 5 per cent. for the past half year declared, the Directors and Auditor re-elected, and a vote of thanks passed to the Directors for their able management of the affairs of the Company.

Canterbury Gas and Water Company.—The half-yearly meeting of this Company was held on Friday, the 30th ult.—Mr. G. Furley in the chair. The report which was presented stated: "The Directors have again the pleasure of announcing to the Proprietors the prosperous state of the Company's business, as shown by the annexed statement of accounts and balance-sheet for the half year ending June 30, 1878. The alterations at the water-works, referred to in the last half-yearly report, have all been satisfactorily carried out by the contractors, and your Directors hope to find that the new steam boiler will still further economize the cost of pumping. The alterations and additions to the buildings in the gas-works are being proceeded with, and will be finished during the present season, ready for use during the ensuing winter. The balance standing to the credit of the profit and loss account is £2998 5s. 8½d., and your Directors are therefore able to recommend that the maximum dividend of the half year, after the rate of 8 per cent. per annum, free from income-tax, be declared." The Chairman moved, and Mr. Flint seconded, the adoption of the report and the declaration of the dividends, and the meeting closed with a vote of thanks to the Directors.

King's Lynn Gas Company.—The half-yearly meeting of this Company was held on Friday, the 30th ult.—Mr. J. D. Thew in the chair. The report of the Directors gave as a result—gas sales, £6867 19s. 7d.; rent of meters, £248 19s. 11d.; residual products, £1848 17s. 7d.; miscellaneous, £367 6s. 1d.; with stock, £500; total, £9833 3s. 2d. Expenditure—manufacture of gas, £6060 14s.; interest on borrowed capital, £413 16s. 9d.; salaries, £909 8s. 9d.; stock in hand, £505; balance, £1944 3s. 8d.—total, £9833 3s. 2d. To the balance was added the balance of last year's account, making a total of £3765 12s. 9d. The Directors recommended that the dividend for the year should be at the rate of 5½ per cent., one-half of which was paid in February last as an interim dividend. The disposable balance remaining —£2005 12s. 9d.—enabled the Directors to pay a like dividend. It was stated that there had been a large sum paid for renewals. The Chairman moved the adoption of the report, which was seconded by Mr. T. Bagge, and passed. Mr. Stevenson proposed the dividend at the rate of 5½ per cent., which was carried, the balance left to be carried forward to next account. The Chairman proposed—"That the capital of the Company be converted or consolidated into general stock, to be divided amongst the Shareholders according to their respective interests therein; but that no stock certificate be issued containing any fraction of a pound." He described the change about to be effected, and, after being seconded by Mr. Bagge, the motion was agreed to. The usual vote of thanks closed the meeting.

Maidstone Water-Works Company.—The half-yearly general meeting of the Shareholders of this Company was held on Thursday, the 29th ult. —Mr. J. Barcham Green in the chair. The Secretary (Mr. J. Case) read the following report:—"The accounts which will be presented to the meeting will show the working of the Company during the last half year, and the financial position of the Company on the 30th day of June last. For the quarter ended on the 31st day of December last, the Company received for water-rents the sum of £1161 18s.; for the quarter ended on the 31st day of March last the sum of £1119 4s. 5d.; for the quarter which ended on the 30th day of June last it is estimated the rents will amount to about £1140. The balance-sheet shows a profit for the half year of £599 0s. 4d. In pursuance of the resolution of the special meeting of the Company, held on the 8th day of November of last year, the Directors have entered into contracts for the new engine and boilers for the amount named as the lowest tender at that meeting—viz., £3395. They have also entered into a contract for the erection of the engine-house and boiler-house for the sum of £3238, which sum they very much regret is very greatly in excess of the amount they hoped to get the work done for. The erection of the engine and boiler house is now proceeding very rapidly, and there is reason to believe that the engine, boilers, and machinery will be delivered as soon as the buildings are ready to receive them. There were, however, unavoidable delays in the commencement of the engine and boiler house, and it is not expected that the new engine will be at work until some time early in the next year. At the next half yearly meeting in February, the Directors look forward to being able to report that the new engine is at work. The whole of the 660 shares have, in pursuance of the resolution of the meeting of the 8th of November, been offered to the ordinary Shareholders, and were all taken up by them, and two calls have become due. The Company have hitherto paid interest at the rate of 5 per cent. on the mortgage debt of £7500, but they have lately asked the mortgage creditors if they would be willing to accept interest at the rate of 4 per cent., to which they have all assented. Interest at the reduced rate will become payable as from January next. In April Mr. Arkcoll, who had been Chairman of the Company since its foundation in the year 1860, resigned the Chairmanship, though continuing to hold office as a director. The Directors have appointed Mr. John Barcham Green as Chairman in the room of Mr. Arkcoll." The Chairman moved the adoption of the report. Mr. D. S. White seconded the motion, which was carried. The statements of accounts were then read, and unanimously adopted on the motion of Mr. L. D. Wigan. This concluded the business of the meeting.

Douglas (Isle of Man) Gas Company.—The half-yearly meeting of this Company was held on Monday, Aug. 26—G. W. Dumbell, Esq., H.K., in the chair. The Directors report and balance-sheet laid before the meeting showed that the net profits for the half year to June last amounted to £1232 0s. 6d., showing an increase, notwithstanding the reduction in the price of gas, of £33 0s. 6d. The affairs of the Company were in a prosperous state, and in a position to make a reduction in the price of gas from the 1st of October next, and also in the price of coke. It recommended a dividend for the past half year at the rate of £1 5s. per share. The Chairman, in moving the adoption of the report, said that, so far as he was able to judge, it was a very satisfactory one indeed. The profit was in excess of the corresponding half year, and it was proposed that shortly a further reduc-

tion should be made in the price of gas and coke. He need not say that so long as the Company were able to supply the public at a moderate price, and reduce the cost from time to time, they need have no fear of being interfered with; but might feel certain that if they did not there would assuredly be legislation authorizing the formation of a company to compete with them; and probably such a company would be able either to absorb them, or to so compete as to absorb their profits. Therefore, in the management of the Company there were two objects to bear in mind—the Directors must endeavour to earn a profit for the Shareholders, and yet supply the public on such terms as would prevent the Company being interfered with. Mr. P. Killey seconded the motion, which was carried unanimously. The meeting then proceeded to the election of Directors and Auditor, the result being that Messrs. Okell, Naylor, Watts, Wilkins, and Roney were appointed the Board, Mr. Wilkins taking the place of Mr. D. E. Gelling; the Auditors being Messrs. Goldsmith and Fargher. Mr. Naylor, in returning thanks for the appointment of the Directors, said that he had been 14 years connected with the Company, and he could assure the meeting that, in the future as in the past, nothing would be wanting on his part to make it as prosperous a concern as it possibly could be made. The Directors spent a good deal of time in connection with the affairs of the Company, and their anxiety was that not only the Shareholders, but the public as well, should have their just rights. So long as they had the Shareholders confidence, every effort of his would be used to advance the interests of the Company. A vote of thanks to the Directors and Auditor having been passed, the Chairman proposed that the thanks of the meeting be given to the officers—one and all—for their services, and for the able manner in which they carried on the affairs of the Company. He said he believed that they had its interest at heart as much as if the concern belonged to themselves. Mr. W. Gell seconded the motion, which was carried unanimously. Mr. Quinney (the Secretary) and Mr. Smith (the Manager) having returned thanks, the meeting separated.

Register of New Patents.

1805.—Dülken, A., Dusseldorf, Prussia, "*A new mode of constructing water-meters, capable of serving at the same time as prime movers.*" Patent dated May 9, 1877.

This water-meter consists mainly of a pair of cylinders arranged at right angles, or so as to cross each other, but in different planes, and placed within a fixed casing, in which they are arranged eccentrically, and are capable of rotating therein on pivots or trunnions provided for the purpose, and running in suitable bearings in the casing. Each of these cylinders is provided with a piston and piston-rod, which latter passes through both ends of the cylinder, and carries at its ends small anti-friction wheels, which run on rings or circular guides within the eccentric casing. To one of the journals of the cylinders is adapted a cylindrical valve, provided with openings or passages communicating with the two ends of each cylinder, and also with openings communicating with the water supply-pipe and the exit-pipe. The other journal is connected with the registering mechanism, whereby the quantity of water which passes through the meter is indicated.

When water is admitted into one of the cylinders, so as to fill the same, the cylinder (being mounted eccentrically in the casing) will be tumbled over by the weight of the water, and will thus carry round its journals, so as to change the position of the water passages of the valve and admit water into the second cylinder, the first having been brought into the position to discharge its water to the exit opening, and receive another supply on the other side of the piston. This operation will go on alternately in both cylinders, so that a continuous rotary motion will be produced; and as the cylinders are known to hold a certain given quantity of water, it follows that, by counting the rotations of the shaft or journals on which the cylinders are mounted, the exact quantity that passes through the meter will be indicated on the dial.

If the head of water which supplies the meter extends to a considerable height, then the pressure in the cylinder will be great, and an apparatus constructed on the same principle may be used as a meter, for which purpose one or both of the journals may be prolonged beyond the casing, so that a pulley or pulleys may be keyed thereon in order to receive a band, whereby their rotary motion may be communicated to any machine or apparatus which requires to be driven.

1814.—Kirkham, T. N., Abingdon Street, Westminster, Hulett, D., High Holborn, and Chandler, J. and J., Newington Causeway, "*Improvements in apparatus for the purification of gas.*" Patent dated May 10, 1877.

This invention relates more particularly to the washing or scrubbing of gas, and is an improvement upon the invention for which letters patent were granted to the present inventors, No. 422, Feb. 1, 1877.*

In that patent ways and means were shown whereby a large amount of wetted surface was obtained for the extraction of impurities contained in the gas, and the present invention is an improved manner of obtaining these wetted surfaces.

In place of the tubes, thin sheets of iron or other suitable material are used, placed side by side so as to meet the gas edgewise, leaving spaces between for the gas to pass through. The outer vessel is charged with water or other liquid, and the action of the apparatus is as follows:—The thin sheets are placed upon a shaft or shafts, and are operated upon by suitable gearing, and the vessel being charged with water or other purifying fluid to the required height, the surfaces become wetted as they revolve, and thus are presented to the crude gas, which becomes purified by passing through the spaces.

The machines may be constructed with one or more sets of plates or drums; it is, however, to be noted that when more than one set is used in one vessel, each set will work in a separate compartment, and made separate by means of division-plates, in order to have various strength liquors, the division-plates being placed at different heights so as to cause the liquor to overflow from one compartment to another.

The drums, constructed of wire or other open work, are filled with scrap iron or other suitable material, being attached to the shaft, and operated upon in the manner described.

1822.—Milne, J., Edinburgh, "*Improved appliances to railway and tramway carriage gasholders, whereby they may be automatically charged.*" Patent dated May 10, 1877.

In the supply of gas to railway carriages by what is known as the high-pressure system, a reservoir charged with gas at a pressure of many atmospheres is used, and from this reservoir the gas flows through a special form of regulator, and is reduced in pressure before reaching the burners. The plans at present adopted are liable, the patentee says, to induce an irregular pressure in the supply of gas to the burners, and it is the object of the present invention to provide more certain means for ensuring regularity of supply. This is effected by causing the gas, which is under a pressure unsuitable for its proper combustion by such burners as are usually used for lighting by gas, to flow into a holder properly weighted or balanced so that the gas contained in it shall be compressed only to the extent necessary for the supply of all such burners in connection with the holder at a pressure suitable for burning the gas to the best advantage. Within this holder is fixed an inlet regulating-valve so connected with it as to open when the store of low-pressure gas is diminished, and shut again when the holder has been sufficiently refilled from the high-pressure reservoir.

The holder is made in conformity with those described in patent No. 2842, granted to William Thomas Sugg, and bearing date Aug. 12, 1875.

The appliance or regulating-valve which forms the subject of the present invention is made and used in conjunction with the holder as follows:—At the bottom of the holder a trough or recess is formed, and at or near the end of the side of the trough the gas inlet from the reservoir is fixed. The mouth of the inlet within the holder is made internally conical, and forms the valve seat. The valve is made of metal, ivory, bone, or horn; externally conical, and corresponding in size and shape to the valve seat. The valve is fixed to a metal spindle, which is formed into a single or double threaded screw at one end, and works through a nut fixed to the bottom of the holder. The other end of the valve spindle passes through a guide, also fixed to the bottom of the holder. Between the nut and the guide is keyed or fixed a lever, the upper end of which is jointed and attached to the top of the holder, the under side of the lever being furnished with a spring to prevent the valve being opened unnecessarily.

The apparatus acts in the following manner:—The reservoir being charged with gas, a tap is turned and the gas allowed to flow into the holder, which at the commencement is empty, and the valve therefore open. As the holder rises it operates upon the lever, and this in its place actuates the valve spindle, which, being screwed at one end, causes the valve to approach its seat, so that when the holder is full, or nearly so, the valve has reached its seat and the further supply of gas is shut off. When, however, the gas is turned on to the burners, it escapes thereto through the outlet in the holder, and the top of the holder falls.

The lowering of the holder has, of course, the opposite action to its rising; consequently, the valve is opened until sufficient gas from the reservoir has been admitted to refill it. Practically the valve is generally partially open, but so slightly that only just sufficient gas is allowed to pass as will keep the holder full, the result being that the gas when it reaches the burners will be supplied at a pressure equal only to that of the holder or to whatever it is weighted. By these means the supply of gas to the burners may be regulated and maintained with precision.

1918.—Cort, J., Old Kent Road, London, "*Improvements in the construction of valves.*" Patent dated May 16, 1877.

This invention consists in certain improvements in the construction of valves, whereby a perfectly tight joint shall be obtained should the seat of the valves wear out, or be obstructed by dirt or other causes.

The valves are made in the shape of a hollow globe, with openings for the inlet and outlet of the same size as the pipes or mains on which they are fixed. Inside the hollow globe a half spherical door works, kept in position and fixed to a half spherical bridge-piece or bracket working on two centres. The top of the door is furnished with a circular rack, gearing into a pinion, actuated by means of a spindle which passes through a stuffing-box, and is furnished with a hand-wheel.

The door is connected to the bridge-piece or bracket by a screw, the object of which is that, should the door not fit perfectly against its seat at the inlet or outlet of the valve (owing to the wear, dirt, or other causes), by a slight movement of the pinion the door receives a rotary motion through the rack, and is thus screwed tight against the seat.

The door is put in motion, to open or close the valve, by means of a handle fixed to a socket encircling the spindle, and connected to the bridge-piece or bracket.

APPLICATIONS FOR LETTERS PATENT.

3444.—Cropper, J., and Johnson, W., Nottingham, "Improvements in valves for gas-engines." Aug. 30, 1878.

3445.—Siebert, O., Leicester Square, London, "Improvement in gas-light apparatus, and arrangements connected therewith." Aug. 30, 1878.

3462.—Heritage, J., Clapham, London, "Improvements in ball valves." Aug. 31, 1878.

3468.—Giroud, H., Paris, "Improvements in rheometric gas-burners." Sept. 2, 1878.

3472.—Gedge, W. E., Strand, London, "An improvement in stoves or apparatuses for heating by gas." A communication. Sept. 2, 1878.

3474.—Groth, L. A., Stockholm, "Improvements in the construction of gas-burners." A communication. Sept. 2, 1878.

3488.—Gedge, W. E., Strand, London, "Improvements in suspending and adjusting sliding gaseliers or gas apparatuses." A communication. Sept. 3, 1878.

3516.—Brough, R., and Bell, C., Sunderland, Durham, "Improvements in self-closing taps or valves." Sept. 5, 1878.

3518.—Molison, A. R., Swansea, Glamorgan, "Improved electrical apparatus for igniting illuminating gas." Sept. 5, 1878.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

804.—Brown, P. S., Carrickfergus, Ireland, "Improvements in the obtainment of sulphate of ammonia from ammoniacal liquors, and in the apparatus employed therefor, the said improvements being also applicable for the obtainment of cyanide and sulpho-cyanide of ammonium." Feb. 27, 1878.

865.—Millar, R., Kilmarnock, N.B., "A new or improved meter applicable for measuring water or other liquids, part or parts thereof being applicable to piston meters generally." March 4, 1878.

902.—Neale, M. T., Adelphi, London, "Improvements in transmitting light, and apparatus therefor." March 5, 1878.

907.—Gunn, E. S., City Road, London, "Improvements in filters." March 6, 1878.

924.—Hopcraft, E., Brackley, Northamptonshire, "Improvements in the purification of water by filtering through animal charcoal, and for the purification of the animal charcoal by oxidation." March 7, 1878.

942.—Linford, C., Leicester, "Improvements in gas-engines." March 8, 1878.

989.—Jennings, G., Stangate, London, and Hinde, G. J., George Street, Wolverhampton, "Improvements in filters for filtering and purifying water." March 12, 1878.

1280.—Bower, G. and A. S., St. Neots, Huntingdon, "Improvements in effecting the protection of iron and steel." April 1, 1878.

1542.—Lake, W. R., Southampton Buildings, London, "Improved apparatus for regulating and controlling the pressure and quantity of gas supplied to gas-burners, and for other like purposes." A communication. April 17, 1878.

1556.—Green, H., Preston, Lancs, "Improvements in apparatus for opening the supply of gas to burners, igniting the gas, and shutting off the supply." April 17, 1878.

1859.—Arundel, G., Sheffield, "Improvements in water-taps." May 9, 1878.

* See Journal, Vol. XXXI., p. 989.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

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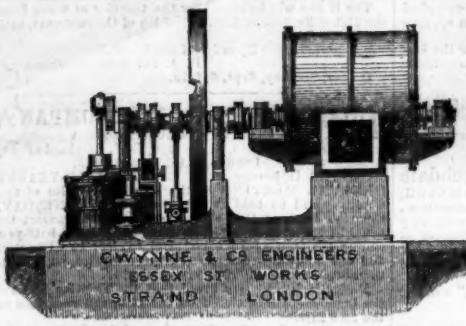
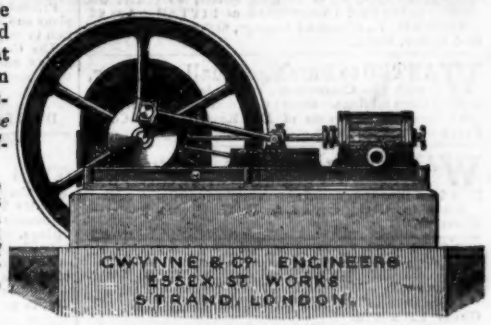


EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

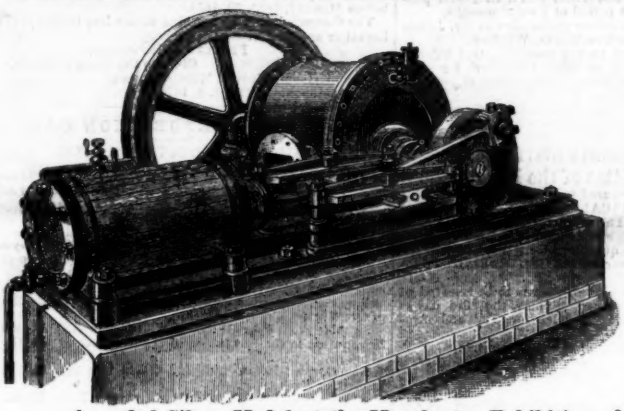
Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS

WITH

Wrought-Iron Spindles and

ENGINES COMBINED.



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MAKERS OF ENGINES, EXHAUSTERS, INDEX AND DISC GAS-VALVES, HYDRAULIC MAIN VALVES, BYE-PASS VALVES, TAR, LIQUOR, AND OTHER PUMPS, SCRUBBERS AND PURIFIERS, CONDENSERS, BOILERS, &c.

Awarded Silver Medal at the Manchester Exhibition of the Society for the Promotion of Scientific Industry.

Phœnix Engineering Works:

HOLLAND STREET, SOUTHWARK, S.E.

TO GAS ENGINEERS.

D. BRUCE PEEBLES & CO.

Beg to call the attention of Gas Engineers to the fact that the novel and original feature in connection with PEEBLES' SYSTEM OF CONTROLLING THE ACTION OF GAS GOVERNORS is the loading or acting on the Bell by Pneumatic Pressure instead of Weights.

TAY WORKS. BONNINGTON, EDINBURGH.

Now Ready, price 28*s., handsomely bound in Morocco, cloth sides, gilt edged and lettered,*

THE FIRST VOLUME

OF

KING'S TREATISE

ON THE

SCIENCE AND PRACTICE OF THE MANUFACTURE & DISTRIBUTION

OF

COAL GAS.

EDITED BY THOS. NEWBIGGING, C.E., M.Inst.C.E., AND W. T. FEWTRELL, F.C.S.

This Volume contains 460 pages of Letterpress, and is illustrated by 521 Woodcuts and 36 page and double-page Engravings, printed on Plate paper, and a full-page

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Forming a Frontispiece to the Volume.

ORDERS RECEIVED BY THE PUBLISHER,

WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

WANTED, Readers of the Pamphlet, "Cooking and Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

TO GAS COMPANIES.

WANTED, by a Young Man, a Situation as METER INSPECTOR or FITTER. Age 26. Address H. T., Stanstead Cottage, Stanstead Road, Catford Bridge, KENT.

WANTED to Purchase, small Scrubber, with 4 in. Connections. Suitable for Gas-Works making three millions. State price, delivered on rails. Address No. 491, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a competent Person, the Management of a small Gas-Works, making from 20 to 25 millions per annum.
Apply to J. G., care of A. H. Wood, Gas Engineer, HASTINGS.

WANTED, a Steady Man as Stoker in the Gorleston and Southtown Gas-Works. Wages 24s. per week.
Apply to W. PALGRAVE BROWN, Secretary, Southtown, GREAT YARMOUTH.

WANTED, a Collector for the Hampton Court Gas Company. Salary, £150 per annum. Security required.
For particulars, apply in own handwriting to W. HAMMOND, Secretary, Hampton, MIDDLESEX.

WANTED, a Steady Man to take charge of small Gas-Works. Must understand Fitting, Service Laying, and General Repairs. Wages 22s. per week; house, coal, and gas free.
Address, enclosing references, &c., to WM. JONES, Gas-Works, Beaufort, BRECONSHIRE.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.
John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

AGENCY.—Wanted, an Engineering AGENT for Lancashire and Yorkshire, residing in the district, for business of considerable magnitude and importance.
Address No. 492, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

LEADING Stoker wanted at once. He must be sober, steady, and trustworthy, and capable of driving an engine and looking after the boiler, &c. Wages 35s. per week.
Apply to the MANAGER, Gas-Works, Lea Bridge Road, ESSEX.

A Gas Engineer is prepared to make the Drawings for the Construction of Generator Stoves with Gas Heating (Retortenofen) of the newest and most approved German system. All measures and sizes are kept for reference.
For further particulars, please address to O., 714, care of Rudolf Mosse's Advertising Agency, Magdeburg, GERMANY.

GAS MANAGER WANTED.

THE Chorley Commissioners are in im- mediate want of a competent and efficient Person to act as MANAGER for their Gas-Works in Chorley, Lancashire. To one thoroughly qualified a liberal salary will be given.
Security required.
Applications, stating salary required, with testimonials, to be sent to me not later than the 24th of September next.
RICHARD JACKSON, Solicitor,
Clerk to the Chorley Commissioners.

BOLTON CORPORATION GAS DEPARTMENT.

ENGINEER AND MANAGER.

THE Bolton Corporation invite applica- tions for the Office of Engineer and Manager of their Gas-Works. He must have a thorough practical knowledge of the Manufacture and Distribution of Gas, and will be required to devote the whole of his time to the duties of the office, and to enter thereon on Jan. 1, 1879.
Applications, stating age, qualification, present employment, and salary required, with testimonials of ability and character, to be sent on or before Sept. 17, 1878, to the undersigned, from whom further information may be obtained.
R. G. HINNELL, Town Clerk.

ON SALE—A Station-Meter (with new Drum), capable of passing 10,000 cubic feet per hour, with Hydraulic Valves, Bye-Pass, &c.; 10-in. Connections. Has been removed to make room for one of larger capacity.
For particulars and price, apply to GEORGE NEWTON, Gas-Meter Manufacturer, Union Street West, OLDHAM.

FOR SALE – One 50 ft. by 14 ft. Gas- HOLDER, nearly new, with Columns and Girders. Price £225, a bargain.
Also a STATION-METER, in good working order, to pass 15 000 feet per hour; and Four 10 ft. PURIFIERS with Hydraulic Centre-Valve.
Apply to J. S. REEVES, Manager, Gas-Works, BILSTON.

MATLOCK.

TO BE SOLD—The Matlock Bridge, Bank Town, Darley, and Rowsley Gas-Works, in a thriving neighbourhood. The owner is 72 years of age, and giving up. Gas, 5s.; 3d. off in 14 days. Coke, 8s. 4d.; Tar, 34s.; Liquor, 9s. 6d.; Coals, 9s. 1d.; Nuts, 7s. 2d. Lime cheap.
Apply to JOSH. WINSOR, Stanedge House, BAKEWELL.

WEST BROMWICH.

ERECTION OF GAS-WORKS.

THE West Bromwich Improvement Com- missioners propose to erect Gas-Works equal to an annual make of 150 million cubic feet, and they invite Gas Engineers to send in competition plans for same.
Printed "Instructions to Engineers," and lithographed plans and sections of the site, may be obtained on application to me, at the Town Hall, West Bromwich.
The Commissioners offer premiums of £100 for the first design, and £50 for the second, subject to the conditions mentioned in the instructions.
CHAS. H. BAYLEY,
Clerk to the said Commissioners.
Dated Sept. 4, 1878.

STATION-METER FOR SALE.

THE Gas Committee of the Rochdale Corporation offer for SALE a STATION-METER, capacity 25,000 cubic feet per hour, 12-in. Connections, Hydraulic Valves, and Bye-Pass, and all other necessary fittings. The Meter to be removed in consequence of extensions.
Any further information thereon can be had from the Manager at the Works.
Tenders, endorsed "Tender for Station-Meter," must be sent to me on or before the 13th inst.
By order,
ZACH. MELLOR, Town Clerk.
Town Hall, Rochdale, Aug. 2, 1878.

THE BUENOS AYRES GAS COM- PANY, LOUIS WILDE, Agent, 42, South John Street, LIVERPOOL.
This Agency has been removed from 4, Cable Street, to above address.
N.B.—The above-named is the Original Company, and has no connection with the Buenos Ayres Gas Company, LIMITED.

AMMONIACAL LIQUOR.

THE Directors of the Windsor Royal Gaslight Company are prepared to receive TENDERS for the Purchase of the AMMONIACAL LIQUOR produced at their Works for a period of Twelve months.
Particulars may be obtained on application to Mr. James Wadeson, Engineer, at the Gas-Works, Windsor.
Tenders to be forwarded to the Secretary, Gas Offices, Victoria Street, Windsor, marked "Tender for Gas Liquor," not later than the 30th of September inst.
By order,
GEORGE CARTLAND, Secretary.
Windsor, Sept. 9, 1878.

TO TAR AND AMMONIA DISTILLERS, &c.

THE Gas Committee of the Huddersfield Corporation are prepared to receive TENDERS for the TAR and AMMONIACAL LIQUOR made at their Works, for One, Two, or Three years, from Jan. 1, 1879, or such other term as may be agreed upon.
Particulars respecting quantity, &c., may be had on application to the Engineer, at the Gas-Works, Huddersfield.
Tenders to be delivered, or sent so as to be received at the Gas-Works, not later than Monday, the 23rd day of September next, endorsed "Tender for Tar and Ammoniacal Liquor."
By order of the Committee,
JOHN BURGESS, Engineer.
Gas Office, Leeds Road, Huddersfield, Aug. 30, 1878.

NOTICE for RIO DE JANEIRO GAS SUPPLY.—Ministry of Agriculture, Commerce, and Public Works. Given at the Board of Public Works in Rio de Janeiro on July 22, 1878.
By order of his Excellency the Minister of this Department, it is hereby made public, that this Board receives TENDERS for the Illumination of the Capital of the Empire by GAS, according to the terms and conditions hereinafter specified:—
1. The tenders to be delivered in sealed envelopes, addressed to his Excellency the Minister of Agriculture, Commerce, and Public Works, before Three p.m. on the 1st of December of the present year, at the Board of Public Works of the Ministry of Agriculture in this city, or at the respective Brazilian Legations in London, Paris, or Washington.
2. Parties tendering are to enclose with their tenders, but in a separate envelope, testimonials as to their capacity for carrying out the contract.
3. No tender will be considered unless the party tendering has previously deposited in the National Treasury or its branch department in London, at 8, Palmerston Buildings, E.C., or at any of the above-named Legations, as surety, a sum of 50,000 dols., in money of Brazil, or in vouchers of its Imperial Public Debt, or in a corresponding amount in foreign currency—viz., £5000 sterling, 125,000 frs., or 25,000 in American dollars in gold.
4. The tender is only to state the price at which the gas will be supplied per cubic mètre, and the term of duration of the contract, which, in no case, is to exceed 33 years. Subject to the alternative mentioned therein, all the clauses and terms of the specification and general conditions proposed by the Government, and copies of which are to be obtained at the Board of Public Works in Rio, the above-mentioned Legations, or at Messrs. N. M. Rothschild and Sons, in London, must be adhered to without modification or divergence.
5. The tenders will be opened in this City at a public session of the Board of Public Works on Jan. 2, 1879, and the Government will give its decision within 15 days of that date.
6. The contract is to be considered concluded on the acceptance of the tender; the successful competitor having then only to sign the general conditions above referred to, which will be entered in the book kept for that purpose in the office of the Minister of Agriculture.
For greater convenience, any competitor that shall not reside in Rio de Janeiro will have to appoint an agent in this City, with full powers to sign the general conditions at the time of the acceptance of the tender, should he be successful.
7. Should the party whose tender is accepted, on receiving notice thereof, refuse to sign the conditions, his deposit will become forfeited to the National Treasury.
8. The Government do not bind themselves to accept any of the tenders, and reserve the right of considering others within the time fixed by clause 5.
M. BUARQUE DE MACEDO,
Director of the Board of Public Works.

COMMERCIAL GAS COMPANY.
NOTICE is hereby given that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on FRIDAY, the 4th of October, 1878, at Twelve o'clock at noon, to receive the Report of the Directors, to declare a Dividend, to elect Directors, and for other business.
The Books will be closed for the transfer of Stock from the 21st of September inst. to the 4th of October next, both days inclusive.
By order of the Board,
E. J. SOUTHWELL, Secretary.
Offices, Stepney, Sept. 6, 1878.

THE BRITISH GASLIGHT COMPANY, LIMITED.
Chief Office, No. 11, George Yard, Lombard Street, London, E.C., Sept. 4, 1878.
NOTICE is hereby given that the HALF-YEARLY GENERAL MEETING of the PROPRIETORS of this Company will be held at this Office, on WEDNESDAY, the 25th inst., at One o'clock precisely, to transact the usual business, to declare the Dividend for the half year ending the 30th of June last, and to elect two Directors and one Auditor in the place of those who go out by rotation, but who are eligible to be re-elected.
Notice is hereby also given that the Transfer Books of the Company will be closed on the 13th, and re-opened on the 26th inst.
By order of the Court of Directors,
FREDERIC LANE LINGING, Secretary.
N.B.—Any qualified Proprietor intending to become a candidate for either of the above-mentioned offices is required to signify the same by a written notice under his hand, to be left at the Office of the Company twelve days at least previous to the 24th inst.

THE Middleton and Tonge Improvement Commissioners are prepared to receive TENDERS for the Supply, as under, of Cast-Iron Turned and Bored GAS MAINS, Coated with Dr. Smith's Composition.

2000 yds. 3 in., each length 9 ft., and to weigh 0 c. 3 q. 18 lbs.						
500	,, 4	,,	,,	1	1	13
1000	,, 6	,,	,,	2	1	15

Tenders to be addressed to the Chairman of the Gas Committee, and delivered at the Office of the Clerk on or before Monday, Sept. 30, 1878.
The Commissioners do not bind themselves to accept the lowest or any tender.
FREDERICK ENTWISTLE,
Clerk to the Commissioners.
Commissioners Rooms, Middleton, near Manchester, Sept. 4, 1878.

GLASGOW CORPORATION GAS.

RESIDUAL PRODUCTS FOR SALE.

THE Glasgow Corporation are prepared to receive TENDERS for the Purchase of the TAR and AMMONIACAL LIQUOR produced at the Dalmarnock Gas-Works from and after Sept. 1, 1879. The contract to be for such number of years as may be agreed upon.
Forms of tender, on which offers must be made, may be had, and further particulars obtained, on application to the Manager, at the Gas Office, 42, Virginia Street, Glasgow; and offers, endorsed "Tender for Residual Products," will be received by the subscriber up till Saturday, the 26th of October next.
Suitable ground for the erection of Chemical Works may be acquired in the immediate neighbourhood of the Gas-Works.
The Corporation do not bind themselves to accept the highest or any tender.
J. D. MARWICK, Town Clerk.
City Chambers, Glasgow, Sept. 3, 1878.

PADDINGTON.—PUBLIC LIGHTING DEPARTMENT.

TO IRONFOUNDERS, &c.

THE Vestry of this Parish is prepared to receive TENDERS for 50 LAMP-POSTS and COLUMNS.
Pattern, plan, and specification can be seen, and forms of tender obtained, at the above department, Vestry Hall, Harrow Road, Paddington, between the hours of Ten a.m. and Four p.m.; Saturdays, Ten a.m. and One p.m.
The Vestry do not bind themselves to accept the lowest or any tender.
No tender will be considered unless made upon the printed form.
Tenders to be addressed to the Vestry of Paddington, endorsed "Tender for Lamp-posts and Columns," and sent in not later than Three o'clock p.m. on Monday, the 16th day of September inst.
By order,
FRANK DETHRIDGE, Vestry Clerk.
Vestry Hall, Harrow Road, W., Sept. 2, 1878.

CITY OF HEREFORD.

TO GASHOLDER MAKERS, IRON PIPE FOUNDERS, AND OTHERS.

CONTRACT No. 2.

THE Gas Management Committee of the Corporation of Hereford hereby invite TENDERS for the Supply, Erection, and Completion of a TELESCOPIC GASHOLDER, 82 ft. diameter and 30 ft. deep.
Copies of specification may be obtained (on payment of one guinea, which will be returned upon receipt of a *bonâ fide* tender) on application to the undersigned. The drawings will be open for inspection between the hours of Nine a.m. and Five p.m. any work day, at the Gas-Works Office.

CONTRACT No. 3.

For the supply of about
2000 lineal Yards of 16-in. Turned and Bored PIPES.
500 ,, 14-in. ,, ,, ,,
200 ,, 12-in. ,, ,, ,,
Together with a quantity of Special Castings.
Copies of specification may be obtained on same conditions as above.
Sealed tenders, properly endorsed, addressed to the undersigned, to be sent in on or before Monday, Sept. 23 next.
The Committee do not bind themselves to accept the lowest or any tender.
By order of the Committee,
WILLIAM DAVIS, Engineer.
Gas Office, Hereford, Aug. 20, 1878.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

BEST GAS COALS

DIRECT FROM THE

MARQUESS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

For Prices and Particulars, apply to

MR. S. J. DITCHFIELD,

LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

GAS-FITTERS TOOLS.

CRAMPTON BROTHERS

MANUFACTURES AND SPECIALITIES,

SHEFFIELD.

Screw Stocks, Taps and Dies, Tube Wrenches,
Tube Cutters, Tube Vices, Tongs and Pliers, Ratchet Braces,
Staple and Parallel Vices, Vice Benches, &c.

ESTABLISHED 1866.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

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WESTMINSTER, S.W.,

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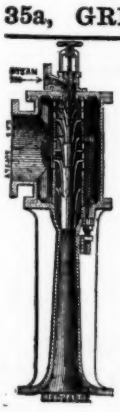

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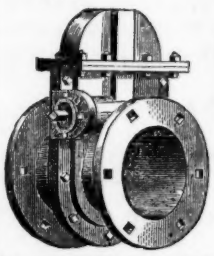

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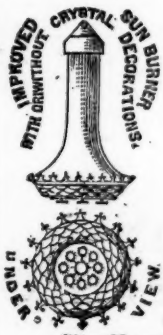

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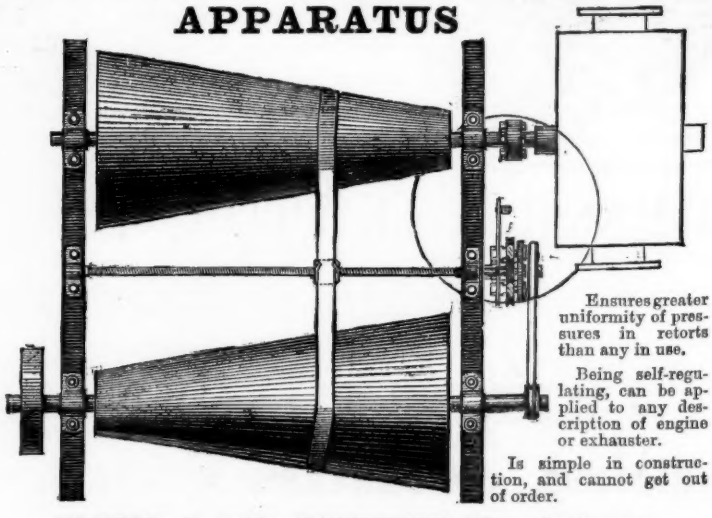

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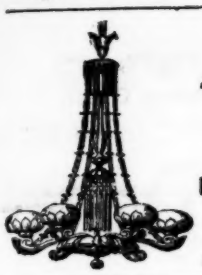

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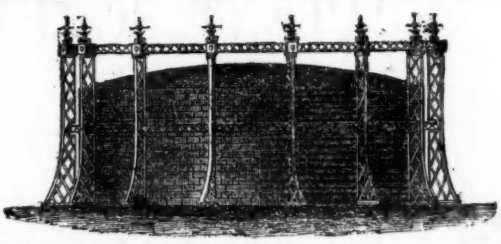

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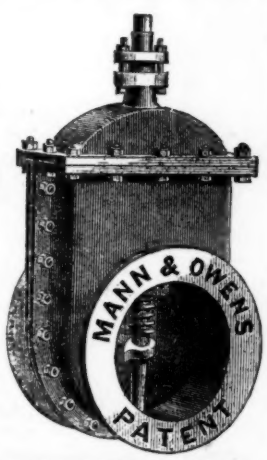

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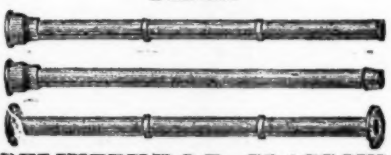

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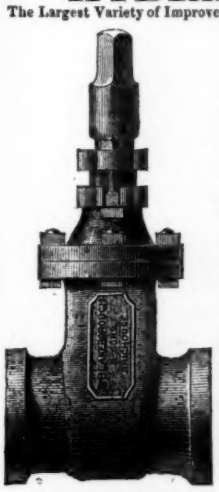

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MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im- portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

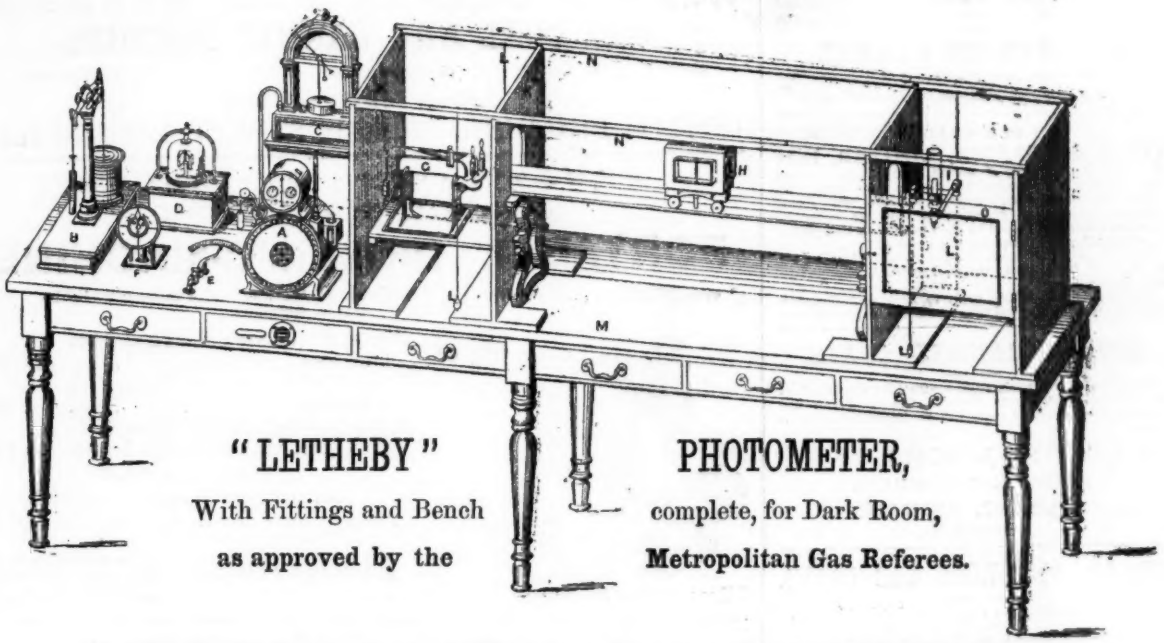
They contain their own engine power, re- quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours or a winter's day, and the smallest make on a summer's day, to be purified.

WILLIAM SUGG,

GAS ENGINEER,

VINCENT WORKS, WESTMINSTER, S.W.



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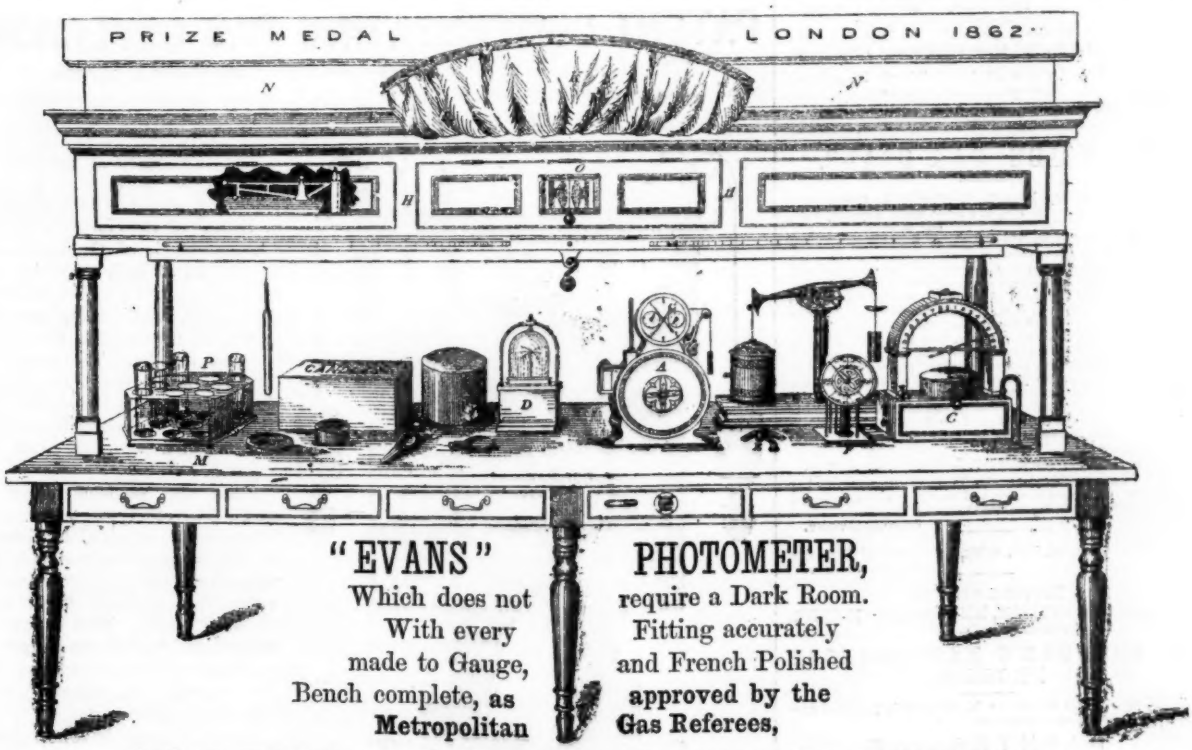

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Which does not require a Dark Room.

With every Fitting accurately made to Gauge, and French Polished

Bench complete, as approved by the Metropolitan Gas Referees,

And as supplied and fixed by me at the Metropolitan Testing-Stations.

Price Lists and all Particulars on application.

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LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

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Yields 13,320 cubic feet of 32·5-candle gas per ton.

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GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

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Established 1840.

DEAN'S PRIMROSE GAS COALS.

South Metropolitan Gaslight and Coke Company, London, July 12, 1878.

The Owners of the Dean's Primrose Colliery.

Dear Sirs,—I have much pleasure in stating that this Company have regularly used your Coals for more than thirty years, and that in all essential particulars they give the most satisfactory results.

The yield of Gas is from 9700 to 9800 feet per ton, of full 16 candles illuminating power, tested by the London Referees Standard Burner; and the Coke is of very good quality, while the quantity is about 40 bushels to the ton of Coal.

I consider Dean's Primrose Coals to rank amongst the first-class Gas Coals from the Durham Coal-Field.

Yours truly, GEORGE LIVESEY.

These Coals are also used by The Gaslight and Coke Company (London), and other English and Foreign Gas Companies.

Steamers loaded with quick despatch in the River Tyne. Price and other terms on application at the

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HOLMSIDE GAS COALS.

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At the request of Mr. Hedley, the owner of the Holmside Colliery, I have much pleasure in stating that, for about ten or twelve years past, this Company has taken at least half of its supply of Newcastle Coal from him. I can, therefore, confidently bear testimony to the good quality of the Holmside Coals, and consider they are equal to the best of the Newcastle Coals, in proof of which I may state that this year we are using those Coals exclusively, that the yield of Gas is from 9700 to 9800 feet per ton, and that the quality of the Gas, without any admixture of Cannel, is over 16 candles, as tested by the officer appointed by the Metropolitan Board of Works, using the London Gas Referees test.

The Coke is of excellent quality, and in quantity amounts to about 40 bushels from a ton of Coal.

The annual consumption of Coal amounts to about 75,000 tons.

GEORGE LIVESEY, Engineer and Secretary.

P.S.—I am at this date, Feb. 15, 1875, still using Holmside Coals as largely as ever, and am quite as well pleased with them as when I gave the above certificate.

GEORGE LIVESEY.

We are this year, 1878, using 80,000 tons of Holmside Coal. GEORGE LIVESEY.

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All negotiations respecting M. Brémond's patented process for preventing Deposits of

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E Size, for Services in Pipes, 2 to 3 in. bore	£3 10 0
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Drills, 1s. 6d. each.

Machines sent on approval, if desired.

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GLOBE METER-WORKS,

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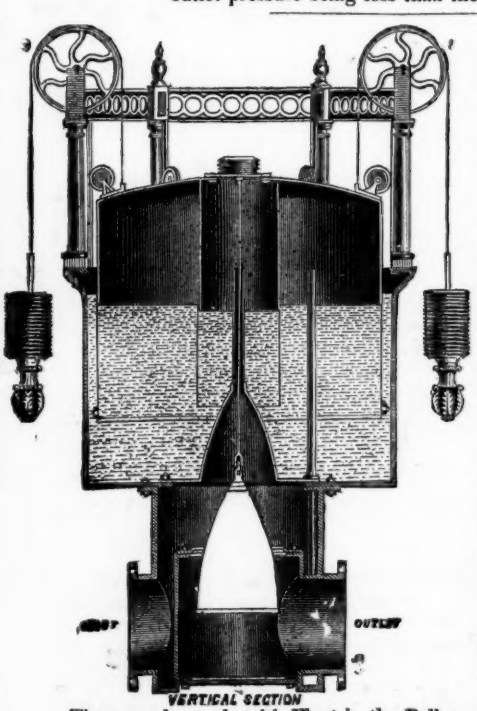
Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

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REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

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FARNLEY, near LEEDS,

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FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

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Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

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NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"Warrington Gaslight and Coke Company,
Offices, Mersey Street, Warrington, April 23, 1877.

"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly, "JAMES PATERSON."

Full particulars will be sent on application to us—address as above.

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PRIZE MEDALS.
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COMBINING ALL THE LATEST IMPROVEMENTS,

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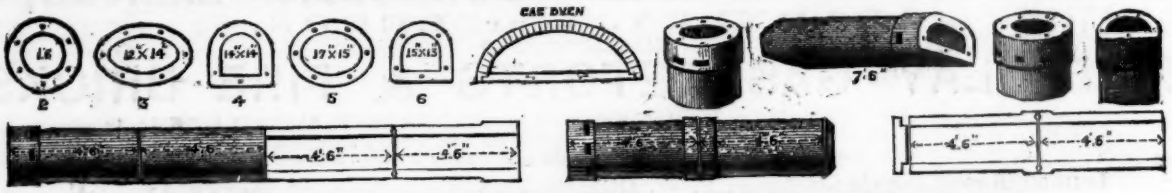

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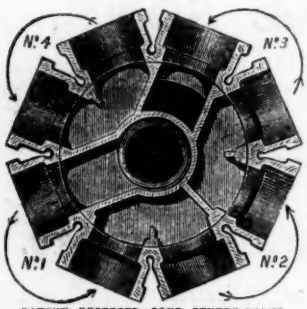

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Sectional Plan.

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RECESSED CONE CENTRE-VALVES,

Constructed on the principle of the ordinary Plug-Cock.

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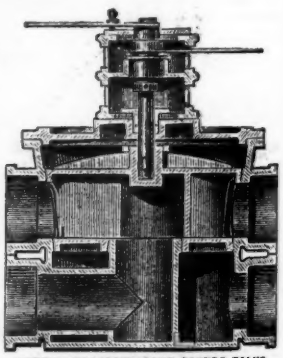
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Invite the attention of Gas Companies, Corporations, and others to their

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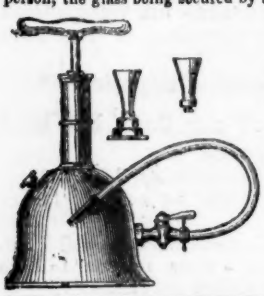
Which are so constructed that neither putty nor other materials are required to secure the glass. No hacking out of old putty, which frequently destroys the frames. A new pane of glass can be inserted in two or three minutes by any inexperienced person, the glass being secured by a hinged flap and turn button.



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For inserting in mains, to prevent the excess of pressure in high ground, or other elevated positions.

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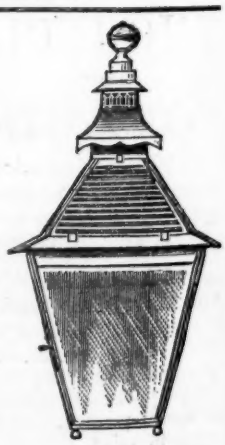

55 and 56, HIGH HOLBORN, LONDON

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